US 20030016813A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2003/0016813 A1**

Weiner (43) **Pub. Date: Jan. 23, 2003**

(54) **PERSONAL RING TONE MESSAGE INDICATOR**

(75) Inventor: **Moshe Weiner**, Kiryat Savionim (IL)

Correspondence Address:
SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, DC 20037-3213 (US)

(73) Assignee: **COMVERSE NETWORK SYSTEMS, LTD.**

(21) Appl. No.: **09/906,085**

(22) Filed: **Jul. 17, 2001**

Publication Classification

(51) **Int. Cl.**[7] **H04M 1/00**; H04M 3/00

(52) **U.S. Cl.** **379/373.02**

(57) **ABSTRACT**

A system and method of message indicating that enable the sender of a message to chose the ringing tone of the receiver's cellular telephone upon arrival of the sender's message. The sender has the ability to either choose or create the ringing tone to be played on the receiver's cellular telephone. The sender also has the ability to create either SMS or multimedia messages to be sent with the ringing tone. The ringing tones may also be chosen or downloaded from Internet sites.

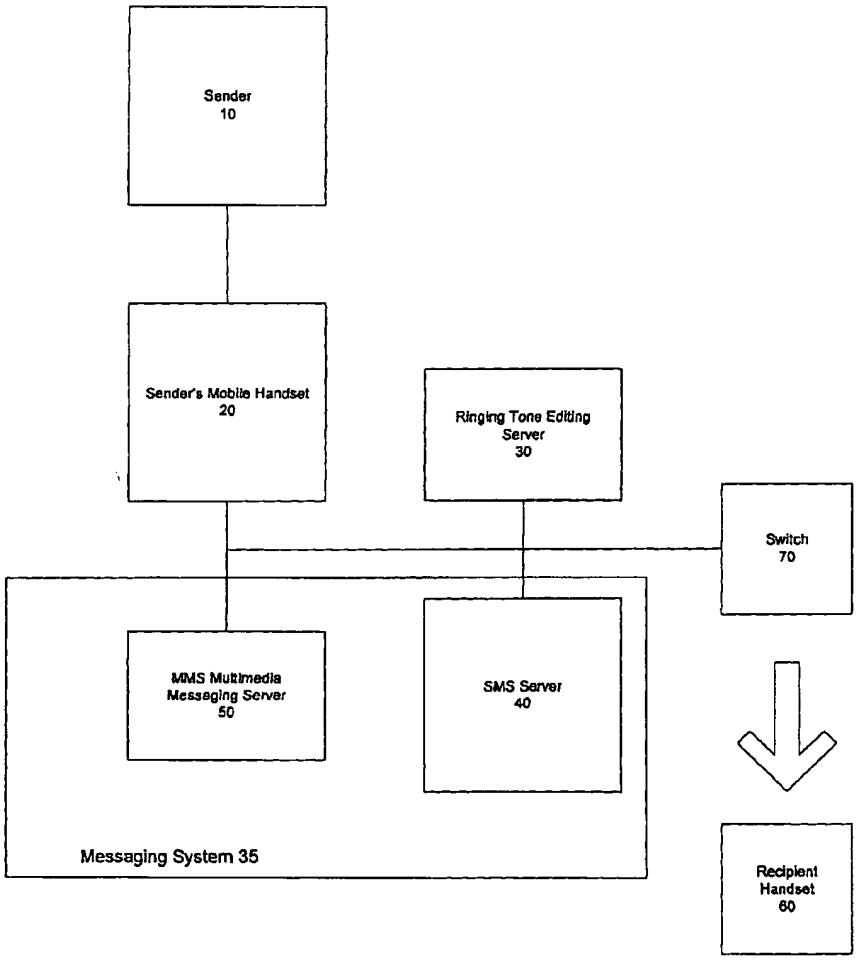


Figure 1

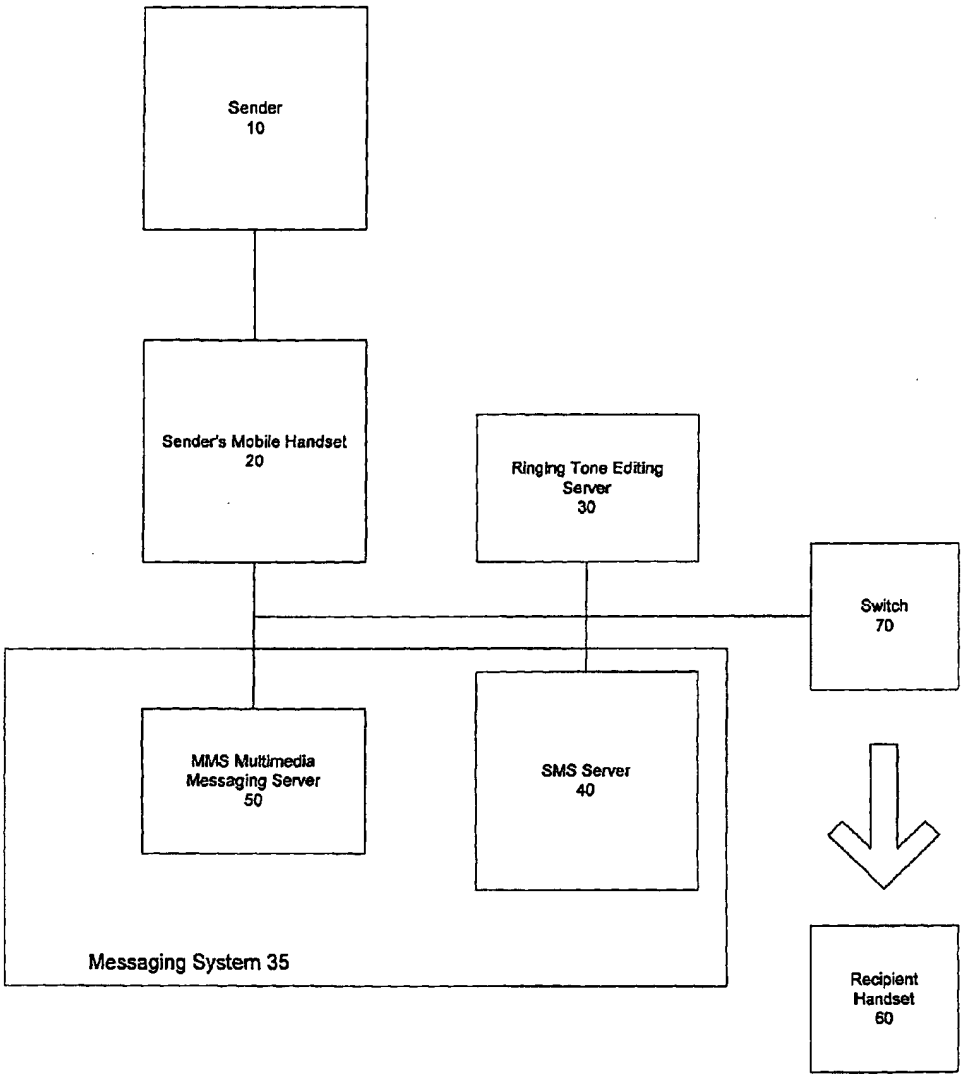

Sender
10
Sender's Mobile Handset
20
Ringing Tone Editing
Server
30
Switch
70
MMS Multimedia
Messaging Server
50
SMS Server
40
Messaging System 35
Recipient
Handset
60

Figure 2(a)

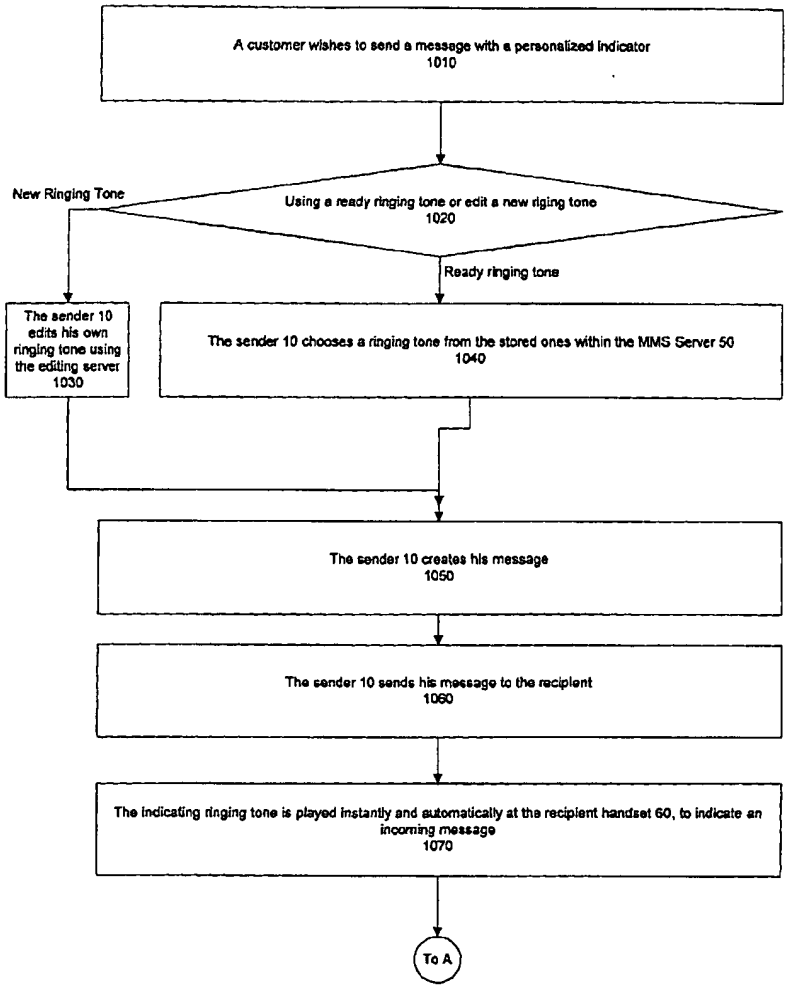
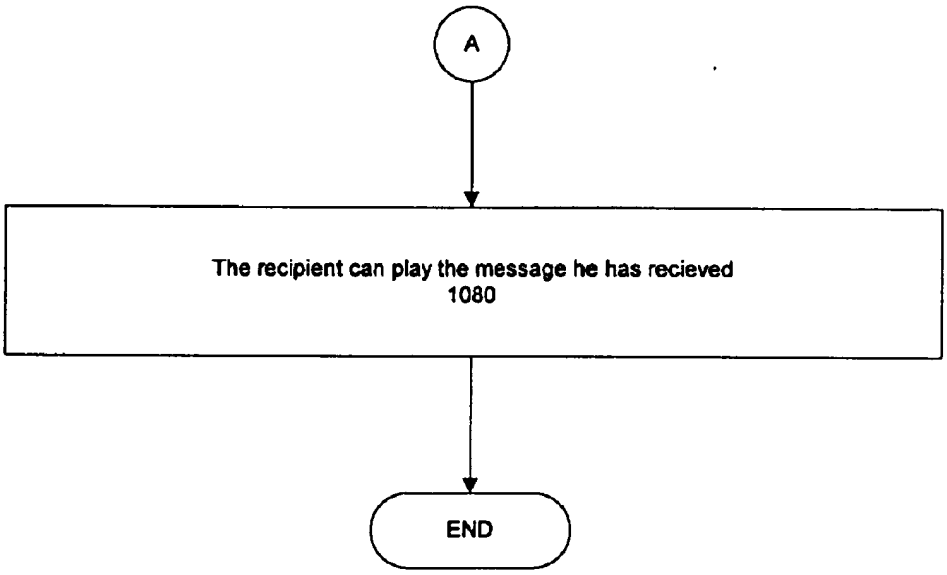


Figure 2(b)


A
The recipient can play the message he has recieved
1080
END

PERSONAL RING TONE MESSAGE INDICATOR

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to a multimedia messaging service ("MMS") application and more specifically to using a multimedia messaging service based application to personalize the ring tone of a receiver's telephone to indicate the presence of a message.

[0003] 2. Description of Related Art

[0004] Multimedia messaging service provides the ability to send and receive messages comprising a combination of text, sounds, images and video to Multimedia Service capable handsets and computers. MMS is a component that can be connected to all possible networks such as cellular networks, broadband networks, fixed line and Internet networks. As technology has evolved so has the needs of its senders. Senders, such as cellular telephone senders, demand more out of their messaging service. They require the ability to send and received such items as business cards, post cards and pictures.

[0005] Accordingly, MMS was developed to provide enhanced messaging, based on the senders' new demands. In the 3G cellular (3rd generation of cellular communication specifications) architecture, MMS has been added. As stated above, this allows senders of cellular telephones to send and receive messages exploiting a whole array of media types while also making it possible to support new content types as they become popular. MMS is well known in the art and has been standardized in the telecommunication world (see standard 23.140, of release 2000 of the 3GPP-3G Partnership Project as it appears in European Telecommunications Standards Institute (incorporated herein by reference). For current standards see ETSI at 650, route des Lucioles, 06921 Sophia Antipolis, France, Telephone No. +33 4 92 94 42 00, Fax +33 4 93 65 47 16, secretariat@etsi.fr).

[0006] Mobile Originated Short Messaging Service ("MO-SMS") is a messaging service that allows a cellular telephone sender (the "sender") to send text messages to another cellular telephone sender (the "receiver"). When the sender sends a message to the receiver, the receiver's cellular telephone indicates that a message has arrived by using the ringing tone set by the receiver. Said differently, the receiver chooses to set the ringer on his cellular telephone to a particular ringing tone which in turn is played every time any message is received regardless of who sent the message.

[0007] Today, most mobile telephone senders can select a ring tone from several ring tones that come with their cellular telephones, i.e. ring tones that are predefined by the mobile telephones' manufactures. Ring tones can also be downloaded from various sources, such as the Internet, into many mobile telephones. Additionally, both some mobile telephones allow senders to edit their own ringing tone by specifying the musical notes or tones to be played.

[0008] The SMS standard as it exists today transfers the message to the receiver's cellular telephone, but it does not enable automatic instant play of the messages (i.e. each message is not played immediately upon receipt by the mobile telephone). This means that the sender may send a personal tone as part of an SMS message (e.g. the letters chosen by the sender represent musical tones, for example the letter C represents the musical tone "Do", D represents "Re" and E represent "Me" . . . . The handset converts the letters to musical notes and plays the corresponding musical notes.), but the personal tone will not cause the receiver's cellular telephone to ring automatically using the sender's personal ringing tone. Rather, the receiver is only able to hear the sender's personal tone after the message is played. In other words, the sender's personal ringing tone is not the ringing tone that is played by the receiver's cellular telephone to indicate the arrival of the senders message.

SUMMARY OF THE INVENTION

[0009] The present invention solves the problems and shortcomings attendant with known messaging services by providing a messaging application that gives a sender the ability to send a personalized ringing tone that will cause a receiver's cellular telephone to ring using the sender's personalized ringing tone upon arrival of the sender's message. Further, the invention provides a messaging application that allows a mobile telephone to play a sender's personalized ringing tone upon the arrival of the sender's message. Said differently, the sent message contains two parts. The first part is the sender's personalized ringing tone while the second part is that actual text that the sender wants the receiver to read.

[0010] The present invention further solves the above-described problems and limitations by enabling sender to choose the ringing tone that will ring when his message arrives at the receiver's cellular telephone. This allows the receiver to know instantly whom the message is from simply by hearing the ringing tone of his cellular telephone.

[0011] In a preferred embodiment of the present invention, a sender enters a messaging service using the sender's cellular telephone. The sender then chooses to use an already created ringing tone from an MMS server or to edit his own ringing tone by using a ringing tone editing server. Then, the sender creates his message using either a regular SMS message server or an MMS message server. The message is then sent to a receiver and the sender's chosen ringing tone serves as an automatic play-SMS message and the content of the message the sender has created is sent as a regular SMS or as a multimedia message. The receiver will automatically hear the sender's indicating ringing tone, and can choose whether to read the received message.

[0012] In another embodiment of the present invention, the sender uses a personal computer or a fixed telephone to gain access to the messaging servers.

[0013] In yet another embodiment of the present invention, the sender chooses or downloads a ringing tone from an Internet source.

[0014] Further objects, features and advantages of the invention will become apparent from a consideration of the following description and the appended claims when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The above aspects of the present invention will become more apparent by describing in detail embodiments thereof with reference to the attached drawings, in which:

[0016] FIG. 1 is a block diagram illustrating the interrelationships between the components of the personalized indicating ringing tone system of the present invention; and

[0017] FIGS. 2(*a*) and 2(*b*) show a flow chart of the process of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] Hereinafter, embodiments of the present invention will be described in detail with reference to the attached drawings. The present invention is not restricted to the following embodiments, and many variations are possible within the spirit and scope of the present invention. The embodiments are provided in order to more completely explain the present invention to one skilled in the art.

[0019] Referring to FIG. 1, a sender **10** using, for example, the sender's mobile handset **20** accesses the messaging system **35** of the present invention. In this embodiment, the sender **10** uses a mobile handset **20** but this should not be construed as a limitation. The sender **10** may, for example, also gain access to the messaging system **35** using other terminals such as a personal computer or a fixed telephone.

[0020] Once the sender **10** gains access to the messaging system **35** of the present invention, the sender **10** can choose to use an already created ringing tone that is stored within the MMS multimedia messaging server **50** or choose to edit his own using the ringing tone editing server **30**. As previously stated, the sender **10** can also import a ringing tone from a source exterior to the messaging system **35** such as from an Internet site. Within such Internet sites, there typically exists a tick box that asks the sender **10** whether the sender **10** would like the ringing tone sent as an SMS to the message indicating system. The sender **10** simply enters a known virtual telephone number for the server **40** and the Internet site sends the selected ringing tone to the server **40**. The server **40** then forwards the selected ringing tone to the sender's handset. Once the ringing tone is sent to the sender's handset, the sender **10** is free to use the selected ringing tone.

[0021] The ringing tone editing server **30** allows a sender **10** to edit his chosen ringing tone note-by-note. However, the ringing tone editing server **30** is not limited to note-by-note editing. The ringing tone editing server **30** uses, for example, automatic voice assistance to guide the sender through the editing procedure.

[0022] The ringing tone editing server **30** is based on the seven basic notes in music. These notes are given names of alphabet letters from A to G which correspond to different pitches. Also there are additional notes in between the letters called sharps and flats. These notes are represented by putting a sign behind the alphabetic letter. For example a B-sharp is symbolized as "B#". The ringing tone editing server **30** enables a sender **10** to add to a letter one of two possible signs: # for sharp notes and ^ for flat notes. Accordingly, writing music using the ringing tone editing server **30** is similar to writing text in that a sender **10** simply writes the letters (and signs if needed) which correspond to the pitch of the notes that the sender **10** would like to be played.

[0023] Once the sender **10** has chosen his personalized ringing tone, the sender **10** can then create his message. The sender **10** can create either a regular SMS message using the SMS server **40** or the sender **10** can create a multimedia message using the MMS multimedia messaging server **50**. The sender **10** is not limited to creating his message using either the SMS server **40** or the MMS multimedia messaging server **50**. For example, the sender **10** may also create his message using any type of application exterior to the messaging system **35** and import it into the messaging system **35** to be sent with the ringing tone. For example, the sender **10** can create a message using PC and an Internet application, as provided by many wireless service providers.

[0024] When the message is created and the ringing tone is chosen, the message is then sent to the recipient handset **60**. The present invention then has the chosen ringing tone played automatically at the recipient's handset **60** when the message arrives at the recipient's handset **60**. In a conventional cellular telephone, there is a special signaling channel between the telecom switch **70** and the handset (see OTA, "Over the Air" described in detail in GSM standard 11.14 of the 3GPP-3G Partnership Project at the European Telecommunication Standards Institute 650, route des Lucioles, 06921 Sophia Antipolis, France, Telephone No. +33 4 92 94 42 00, Fax +33 4 93 65 47 16, secretariat@etsi.fr (incorporated herein by reference)).

[0025] The command to activate the ring indicating the arrival of the sender's message, comes from the switch **70** to the handset by using the signaling channel. The receiver's ringing tone is stored in the telephone's memory, and when the telephone receives the command to activate the stored ringing tone, the receiver's telephone rings with the activated ring tone. However, in the present invention, the ringing tone editing server **30** asks the switch **70** to send an OTA (Over the Air) command. The OTA command instructs the recipient's handset **60** to play the ringing tone that has been sent with the message.

[0026] Although in the preferred embodiment the recipient handset **60** is a cellular telephone, other terminals may be used. For example, the recipient handset **60** may be any type of message receiving apparatus that posses a SIM card such as GSM "powered" PDAs and cellular communication ports.

[0027] Referring to FIGS. 2(*a*) and 2(*b*), the process of a preferred embodiment of the present invention is discussed although this process should not be considered as limiting the present invention. A sender **10** enters the messaging system **35** of the present invention wishing to send a message with a personalized indicator at operation **1010**. Upon entering the messaging system **35** of the present invention, the sender **10** is given the option of choosing an already created ringing tone or editing a new ringing tone at operation **1020**. If the sender **10** chooses to use an already created ringing tone, then the sender **10** chooses a ringing tone from the ringing tones stored within the MMS multimedia messaging server at operation **1040**. However, if the sender **10** chooses to create a new ringing tone, then the sender **10** creates the new ringing tone using the editing server at operation **1030**.

[0028] After deciding on a personalized ringing tone, the sender **10** then creates his message at operation **1050**. The sender **10** can create his message as an SMS message using either an SMS server **40** or the sender **10** can create a

multimedia message using a MMS multimedia messaging server **50**. The message is then sent to the recipient handset at operation **1060**.

[**0029**] The message is subsequently received by the recipient handset **60**. Upon arrival of the sender's message, the sender's personalized ringing tone is automatically played on the recipient's handset. This may indicate to the recipient that a message from the particular sender **10** has arrived at operation **1070**. Regardless of the settings of the recipient's handset, the recipient's handset will play the personalized ringing tone of the sender (sender) **10**. As stated above, the message has a command code within it that takes control of the recipient's handset **60** when the message arrives and plays the ringing tone. The command code within the message instructs the recipient's handset **60** not to ring the usual tone that notifies the message has arrived. Specifically, when a message arrives at the recipient's handset, the message and ringing tone are saved on a SIM card in the recipient's telephone. Modern GSM telephones from at least the Second Generation have advanced SIM cards. These SIM cards include an application enabling software which is called SIM toolkit application. This software and the SIM card is defined by the GSM association in GSM standard 11.14, which is incorporated herein by reference. The present invention may be practiced using this standard although it is not limited thereto. The command code, written according to standard 11.14, sent with the message and ringing tone instructs the proactive SIM toolkit application (within the recipient's telephone) to request control from the CPU of the receipt's telephone. In this way, the incoming message takes control over the recipient telephone's message indicators, ring tones, display . . . etc. Therefore, the sent ringing tone can be played instead of the recipient's usual ringing tone to indicate the arrival of the sender's **10** message.

[**0030**] Part of the message is the ringing tone. The rest of the message will be played only if the recipient chooses to play the message. Thus, only the ringing tone will be played automatically. Once the recipient receives the message, the recipient can play the sender's message at operation **1080**.

[**0031**] The recipient may not know who the message is from the first time the sender's ringing tone is played. After the recipient learns what ringing tone the sender **10** has chosen, he will be able to easily recognize who the message is from simply by the ringing tone. For example, if Mary sends a ringing tone that plays "Mary Had a Little Lamb", the recipient may not know who the message is from the first time the recipient's handset **60** played "Mary Had a Little Lamb" (unless, for example, Mary told the recipient what her ringing tone was prior to sending the message). However, the next time the recipient's handset **60** played "Mary Had a Little Lamb", the recipient would know that a message had arrived from Mary.

[**0032**] Although the above described a preferred embodiment, other embodiments are also available. For example, in another embodiment of the present invention, the sender **10** chooses a ringing tone from a source exterior to the messaging system **35**. The sender **10** may also edit a ringing tone using an editing application that is also exterior to the messaging system **35**. Along those same lines, a sender **10** may also acquire/download a ringing tone from the MMS multimedia messaging server **50** and use an editing application that is exterior to the messaging system **35**. Another example may be adapting the present application to automatically use the indicating ringing tone on the recipient's personal computer or fixed telephone.

[**0033**] Additionally, the present invention can be adapted to eliminate the need for the ringing tone editing server **30** and/or one of the MMS or SMS servers. For example, the present invention can be adapted to use only the SMS server and allow the sender to choose a ringing tone from one of many stored in the SMS server.

What is claimed is:

1. A message indicating system comprising:

a server operable to create a message and operable to store a plurality of different message indicating ringing tones,

wherein a message indicating ringing tone selected by a sender is played automatically by a receiving unit when a message created by the server arrives at the receiving unit.

2. The message indicating system of claim 1, wherein the sender accesses the message indicating system using a cellular telephone.

3. The message indicating system of claim 1, wherein the sender accesses the message indicating system using a personal computer.

4. The message indicating system of claim 1, wherein the sender accesses the message indicating system using a fixed telephone line device.

5. The message indicating system of claim 1, wherein the server is an MMS multimedia messaging server; and

wherein the message created by the sender using the MMS multimedia server is a multimedia message.

6. The message indicating system of claim 5, wherein the sender accesses the message indicating system using a cellular telephone.

7. The message indicating system of claim 5, wherein the sender accesses the message indicating system using a personal computer.

8. The message indicating system of claim 5, wherein the sender accesses the message indicating system using a fixed telephone line device.

9. The message indicating system of claim 1, wherein the server is an SMS messaging server; and

wherein the message created by the sender using the SMS messaging server is a SMS message.

10. The message indicating system of claim 9, wherein the sender accesses the message indicating system using a cellular telephone.

11. The message indicating system of claim 9, wherein the sender accesses the message indicating system using a personal computer.

12. The message indicating system of claim 9, wherein the sender accesses the message indicating system using a fixed telephone line device.

13. The message indicating system of claim 1, wherein the server is operable to create and edit message indicating ringing tones.

14. The message indicating system of claim 13, wherein the sender accesses the message indicating system using a cellular telephone.

15. The message indicating system of claim 13, wherein the sender accesses the message indicating system using a personal computer.

16. The message indicating system of claim 13, wherein the sender accesses the message indicating system using a fixed telephone line device.

17. The message indicating system of claim 13, wherein the sender creates the message indicating ringing tone using a source exterior to the message indicating system.

18. The message indicating system of claim 13, wherein the message indicating ringing tone created by the sender is downloaded via an Internet connection to the server

19. A message indicating system comprising:

a messaging server operable to create a message;

a storage server operable to store a plurality of different message indicating ringing tones, and

wherein a message indicating ringing tone selected from the storage server by a sender is played automatically by a receiving unit when a message created by the sender using the messaging server arrives at the receiving unit.

20. The message indicating system of claim 19, wherein the messaging server is an MMS multimedia messaging server; and

wherein the message created by the sender using the MMS multimedia messaging server is a multimedia message.

21. The message indicating system of claim 19, wherein the messaging server is an SMS messaging server; and

wherein the message created by the sender using the SMS messaging server is an SMS message.

22. The message indicating system of claim 19, wherein the storage server is operable to create and edit message indicating ringing tones.

23. The message indicating system of claim 20, wherein the sender accesses the message indicating system using a cellular telephone.

24. The message indicating system of claim 20, wherein the sender accesses the message indicating system using a personal computer.

25. The message indicating system of claim 20, wherein the sender accesses the message indicating system using a fixed telephone line device.

26. The message indicating system of claim 21, wherein the sender accesses the message indicating system using a cellular telephone.

27. The message indicating system of claim 21, wherein the sender accesses the message indicating system using a personal computer.

28. The message indicating system of claim 21, wherein the sender accesses the message indicating system using a fixed telephone line device.

29. The message indicating system of claim 22, wherein the sender accesses the message indicating system using a cellular telephone.

30. The message indicating system of claim 22, wherein the sender accesses the message indicating system using a personal computer.

31. The message indicating system of claim 22, wherein the sender accesses the message indicating system using a fixed telephone line device.

32. A method of indicating arrival of a message comprising:

providing a message indicating ringing tone by a sender; and

ringing receiving unit with the message indicating ringing tone provided by the sender.

33. The method of indicating arrival of a message of claim 32, further comprising:

creating a message;

sending the message and the message indicating ringing tone to the receiving unit; and

using the message indicating ringing tone provided by the sender instead of a ringing toe stored in the receiving unit.

34. The method of indicating arrival of a message of claim 33, wherein the message created is an SMS message.

35. The method of indicating arrival of a message of claim 33, wherein the message created is a multimedia message.

36. The method of indicating arrival of a message of claim 33, wherein the message indicating tone is chosen from a plurality of different message indicating tones.

37. The method of indicating arrival of a message of claim 33, wherein the message indicating tone is created by the sender.

38. The method of indicating arrival of a message of claim 33, wherein the message indicating tone is created using the sender unit's keypad.

39. The method of indicating arrival of a message of claim 33, wherein the message indicating tone is created using an Internet site.

40. A message indicating system comprising:

a server operable to create a message containing a sender-selected ring tone,

wherein the sender-selected ring tone is played automatically by a receiving unit when the message created by the server arrives at the receiving unit.

41. The message indicating system of claim 40, wherein said server is operable to create ring tones.

42. The message indicating system of claim 40, wherein said server allows a sender chose among a plurality of stored ring tones.

43. The messaging indicating system of claim 41, wherein said server allows a sender to create ring tone on a note by note basis.

44. A method of creating a message including a ringing tone comprising:

accessing a server operable to create messages;

creating a message by a sender;

selecting a ringing tone by the sender from said server; and

combining said ringing tone with said message by said server, wherein said ringing tone becomes a header of said message.

45. The method of claim 44, wherein said ringing tone comprises a string of alphabetic letters, wherein each alphabetic letter represent a specific musical tone.

46. The method of claim 45, wherein the message is a voice message of the sender recorded by the server.

47. The method of claim 44, wherein the server is an MMS multimedia server.

48. A method of creating a message including a ringing tone comprising:

accessing a server operable to create messages;

creating a message by a sender;

creating a ringing tone by the sender using said server; and

combining said ringing tone with said message by said server, wherein said ringing tone becomes a header of said message.

49. The method of claim 48, wherein said ringing tone comprises a string of alphabetic letters, wherein each alphabetic letter represent a specific musical tone.

50. The method of claim 49, wherein the sender creates the ringing tone by selecting a series of alphabetic letters.

51. The method of claim 50, wherein the sender accesses the server using a cellular telephone and selects the series of alphabetic letters using a keypad of the cellular telephone.

52. The method of claim 48, wherein the sender accesses the server using a cellular telephone.

53. A method of receiving a message-indicating ringing tone message by a receiving unit comprising:

receiving an over-the-air command from a telecom switch;

receiving a message which includes a message-indicating ringing tone; and

using the message-indicating ringing tone instead of a ringing tone stored in the receiving unit to indicate arrival of the message;

wherein said over-the-air command causes the receiving unit to use the message-indicating ringing tone.

54. The method of claim 53, wherein the receiving unit is a cellular telephone.

55. The method of claim 53, wherein the receiving unit includes a SIM card that supports SIM toolkit.

56. The method of claim 53, wherein said message-indicating ringing tone comprises a string of alphabetic letters, wherein each alphabetic letter represent a specific musical tone.

57. A message indicating system comprising:

an MMS multimedia messaging server operable to create MMS messages;

an SMS server operable to create SMS messages;

a telecom switch operable to send over-the-air commands to cellular telephones; and

a ringing tone editing server operable to create new ringing tones and store a plurality of ringing tones,

wherein the ringing tone editing server is interconnected to said MMS multimedia messaging server and said SMS server,

wherein messages created by said MMS multimedia messaging server or said SMS server are combined with a ringing tone selected or created by a sender into a message-indicating message and sent to a receiver's cellular telephone,

wherein said telecom switch sends an over-the-air command to the receiver's cellular telephone, said over-the-air command causes the receiver's cellular telephone to play the ringing tone of the message-indicating message instead of a different ringing tone stored in the receiver's cellular telephone.

58. A method of creating a message including a ringing tone comprising:

accessing a server operable to create messages;

creating a ringing tone by a sender using said server;

creating a message by the sender; and

combining said ringing tone with said message by said server, wherein said ringing tone becomes a header of said message.

59. The method of claim 58, wherein said ringing tone comprises a string of alphabetic letters, wherein each alphabetic letter represent a specific musical tone.

60. The method of claim 59, wherein the sender creates the ringing tone by selecting a series of alphabetic letters.

61. The method of claim 60, wherein the sender accesses the server using a cellular telephone and selects the series of alphabetic letters using a keypad of the cellular telephone.

62. The method of claim 48, wherein the sender accesses the server using a cellular telephone.

63. A method of creating a message including a ringing tone comprising:

accessing a server operable to create messages;

selecting a ringing tone by a sender from said server;

creating a message by the sender; and

combining said ringing tone with said message by said server, wherein said ringing tone becomes a header of said message.

64. The method of claim 63, wherein said ringing tone comprises a string of alphabetic letters, wherein each alphabetic letter represent a specific musical tone.

65. The method of claim 64, wherein the message is a voice message of the sender recorded by the server.

66. The method of claim 63, wherein the server is an MMS multimedia server.

* * * * *

US 20020052224A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2002/0052224 A1

Yoon (43) Pub. Date: May 2, 2002

(54) METHOD FOR EDITING TERMINATING RING TONE IN A MOBILE WIRELESS TERMINAL

(75) Inventor: Woo-Sun Yoon, Kumi-shi (KR)

Correspondence Address:
Paul J. Farrell, Esq.
DILWORTH & BARRESE, LLP
333 Earle Ovington Blbd.
Uniondale, NY 11553 (US)

(73) Assignee: SAMSUNG ELECTRONICS CO., LTD., KYUNGKI-DO (KR)

(21) Appl. No.: 09/918,729

(22) Filed: Jul. 31, 2001

(30) Foreign Application Priority Data

Oct. 31, 2000 (KR) 64365/2000

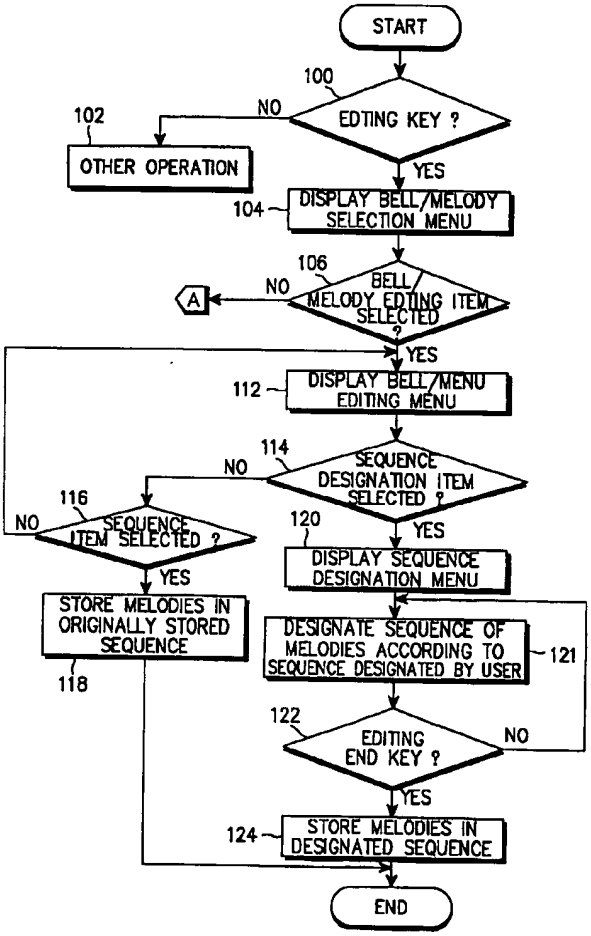
Publication Classification

(51) Int. Cl.[7] H04M 1/00

(52) U.S. Cl. 455/567; 455/458

(57) ABSTRACT

There is provided a method for editing terminating ring tones in a mobile wireless terminal with a memory in which a plurality of melodies are stored. The method comprises displaying a bell/melody selection menu, when a terminating ring tone editing key is input by a user, displaying a bell/melody editing menu, when a bell/melody editing item on the bell/melody selection menu is selected by the user; displaying a sequence designation menu for designating an output sequence of the melodies stored in the memory, when a sequence designation item on the bell/melody editing menu is selected by the user; and setting the output sequence of the melodies according to the sequence designated by the user, and storing the melodies in the memory in the set output sequence.



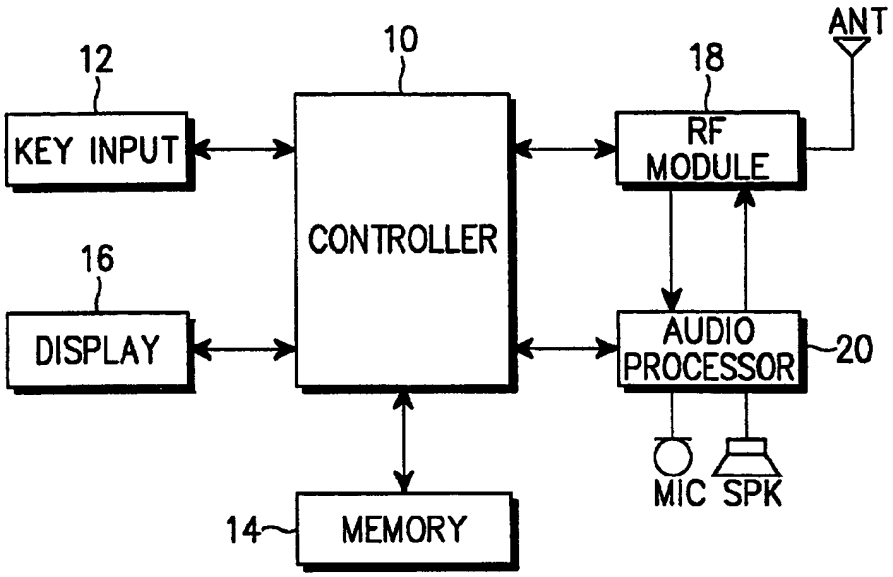

ANT
12
10
18
KEY INPUT
CONTROLLER
RF MODULE
16
DISPLAY
AUDIO PROCESSOR
20
MIC
SPK
14
MEMORY

FIG. 1

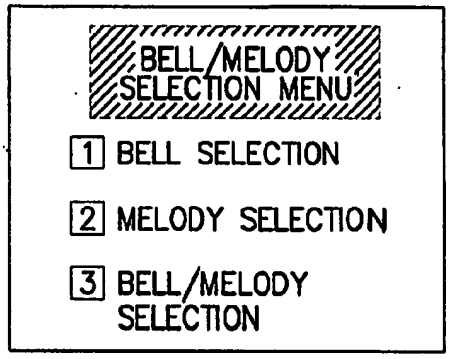


FIG. 2A

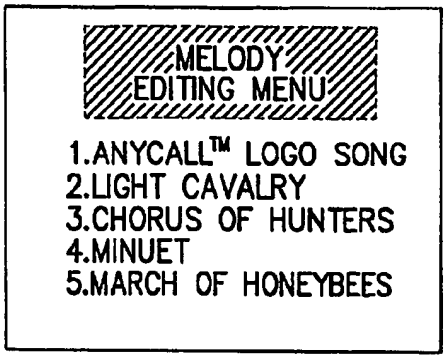


FIG. 2B

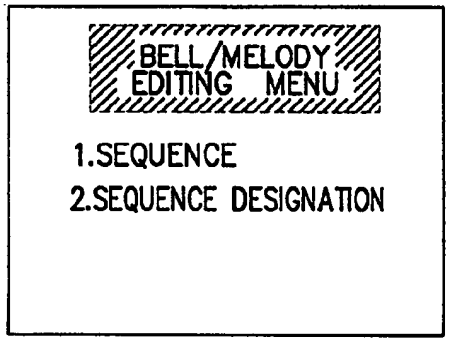


FIG. 2C

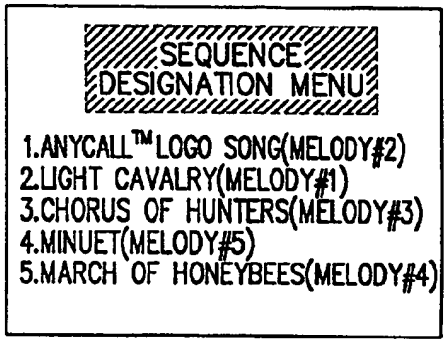


FIG. 2D

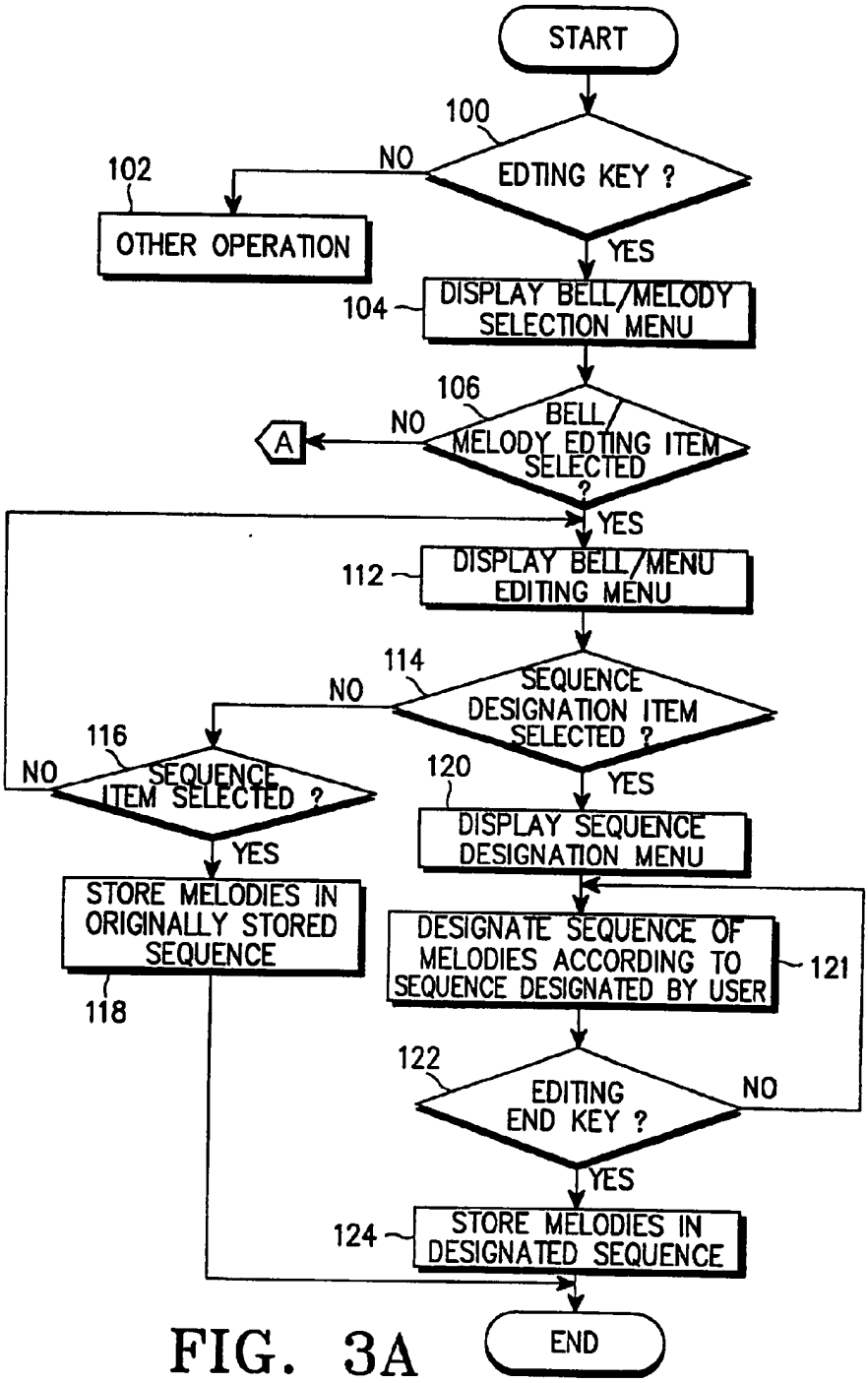

START
100
EDTING KEY ?
NO
YES
102
OTHER OPERATION
104
DISPLAY BELL/MELODY SELECTION MENU
106
BELL/MELODY EDTING ITEM SELECTED ?
NO
A
YES
112
DISPLAY BELL/MENU EDITING MENU
114
SEQUENCE DESIGNATION ITEM SELECTED ?
NO
YES
116
SEQUENCE ITEM SELECTED ?
NO
YES
120
DISPLAY SEQUENCE DESIGNATION MENU
STORE MELODIES IN ORIGINALLY STORED SEQUENCE
118
DESIGNATE SEQUENCE OF MELODIES ACCORDING TO SEQUENCE DESIGNATED BY USER
121
122
EDITING END KEY ?
NO
YES
124
STORE MELODIES IN DESIGNATED SEQUENCE
END

FIG. 3A

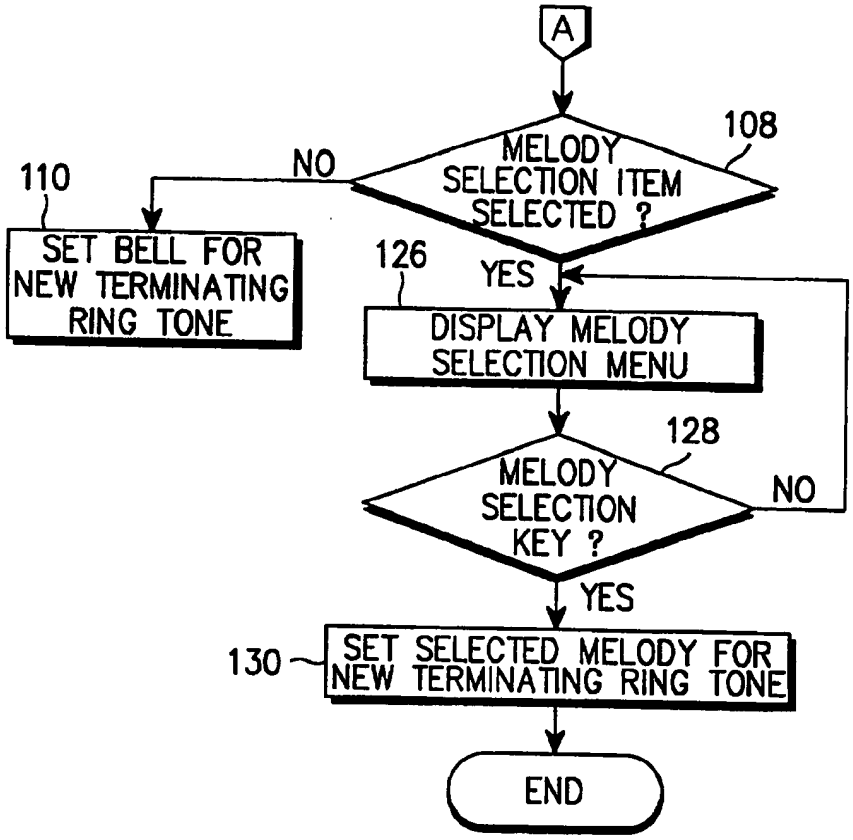

A
108
MELODY SELECTION ITEM SELECTED ?
NO
110
SET BELL FOR NEW TERMINATING RING TONE
YES
126
DISPLAY MELODY SELECTION MENU
128
MELODY SELECTION KEY ?
NO
YES
130
SET SELECTED MELODY FOR NEW TERMINATING RING TONE
END

FIG. 3B

METHOD FOR EDITING TERMINATING RING TONE IN A MOBILE WIRELESS TERMINAL

PRIORITY

[0001] This application claims priority to an application entitled "Method for Editing Terminating Ring Tone in a Mobile Wireless Terminal" filed in the Korean Industrial Property Office on Oct. 31, 2000 and assigned Ser. No. 2000-64365, the contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates generally to a mobile wireless terminal, and in particular, to a method for editing a terminating ring tone generated upon receipt of an incoming call in a mobile wireless terminal.

[0004] 2. Description of the Related Art

[0005] A mobile wireless terminal such as a mobile telephone has a "terminating ring function" for informing the terminal user of an incoming voice call from other mobile wireless terminals or an incoming data call from various information providing servers. The terminating ring function includes a vibration mode and a melody mode that outputs a ring tone on terminating ring tone. In general, the term "terminating ring function" refers to the melody mode.

[0006] A conventional mobile wireless terminal is so designed as to generate a single terminating ring tone designated by the user upon receipt of each incoming call. When using the same terminating ring tone for a long period of time, the user may get tired of the designated terminating ring tone. To solve this problem, the existing mobile wireless terminal stores a plurality of tones or melodies in its internal memory and can download the melodies from a melody providing server via the Internet to also be stored in the memory. However, if the user desires to hear a new terminating ring tone upon receipt of every incoming call, he or she must manually change the presently set terminating ring tone to a desired one of the terminating ring tones before receipt of a next incoming call.

[0007] Therefore, there is a demand for a mobile wireless terminal which can easily set various terminating ring tones, so that the user can hear a new terminating ring tone at each incoming call.

SUMMARY OF THE INVENTION

[0008] It is, therefore, an object of the present invention to provide a terminating ring tone editing method for providing a user terminating ring tones that vary with each new incoming call, in a mobile wireless terminal having a memory in which a plurality of melodies are stored.

[0009] To achieve the above and other objects, there is provided a method for editing terminating ring tones in a mobile wireless terminal having a memory in which a plurality of melodies are stored. The method comprises displaying a bell/melody selection menu, when a terminating ring tone editing key is input by a user; displaying a bell/melody editing menu when a bell/melody editing item on the bell/melody selection menu is selected by the user; displaying a sequence designation menu for designating an output sequence of the melodies stored in the memory when a sequence designation item on the bell/melody editing menu is selected by the user; setting the output sequence of the melodies according to the sequence designated by the user; and storing the melodies in the memory in the set output sequence.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings in which:

[0011] **FIG. 1** is a block diagram illustrating a mobile wireless terminal to which the present invention is applied;

[0012] **FIGS. 2A** to **2D** are diagrams illustrating menus displayed on a display unit of the mobile wireless terminal in the process of editing a terminating ring tone according to an embodiment of the present invention; and

[0013] **FIG. 3** is a flow chart illustrating a procedure for editing a terminating ring tone in the wireless mobile terminal according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0014] A preferred embodiment of the present invention will be described herein below with reference to the accompanying drawings. In the following description, well-known functions or constructions are not described in detail since they would obscure the invention in unnecessary detail.

[0015] In an exemplary embodiment of the present invention, upon receipt of each incoming call, a wireless mobile terminal sequentially outputs a selected one of the melodies stored in its internal memory or outputs the melodies in a sequence designated by the user, thereby providing the user with a unique terminating ring tone upon receipt of each incoming call.

[0016] **FIG. 1** illustrates a block diagram of a mobile wireless terminal to which the present invention is applied.

[0017] Referring to **FIG. 1**, a controller **10** controls overall operation of the mobile wireless terminal according to a control program stored in a memory **14**. In particular, the controller **10** analyzes a terminating ring tone editing key input by the user and displays, on a display **16**, terminating ring tone edition-related menus stored in the memory **14** and the items selected by the user in each editing step. Further, the controller **10** displays the melodies stored in the memory **14** on the display **16**, and controls selecting and changing operations of the melodies. The memory **14** includes a program memory for storing the control program of the mobile wireless terminal and a data memory for storing data generated in the process of editing the terminating ring tone selections.

[0018] The memory **14** according to an embodiment of the present invention includes a storage area for storing a plurality of melodies used for providing the mobile wireless terminal with various terminating ring tones. A key input unit **12** includes a plurality of alphanumeric keys and function keys, and a specific key used for selecting menu items displayed on the display **16**. The key input unit **12**

generates key data according to a key input by the user and provides the generated key data to the controller **10**. The display **16**, for example an LCD (Liquid Crystal Display), displays operating status of the mobile wireless terminal under the control of the controller **10**. Though not shown, the display **16** also includes an LED (Light Emitting Diode) used for visually informing the user of an incoming or outgoing call. An RF (Radio Frequency) module **18** modulates data output from the controller **10**, converts the modulated data to an RF signal, and transmits the RF signal through an antenna ANT. Further, the RF module **18** converts an RF signal received through the antenna ANT to an IF (Intermediate Frequency) signal, demodulates the IF signal, and provides the demodulated signal to the controller **10**. An audio processor **20**, under the control of the controller**10**, converts an analog audio signal input from a microphone MIC to a digital audio signal and converts a digital audio signal provided from the RF module **18** to an analog audio signal to output the converted analog audio signal through a speaker SPK.

[0019] **FIGS. 2A** to 2D illustrate menus displayed on the display **16** of the mobile wireless terminal in the process of editing the terminating ring tone according to an embodiment of the present invention. Specifically, **FIG. 2A** illustrates a Bell/Melody Selection menu; **FIG. 2B** illustrates a Melody Selection menu displayed when a Melody Selection item is selected in **FIG. 2A**; **FIG. 2C** illustrates a Bell/Melody Editing menu displayed when the Bell/Melody Editing item is selected in **FIG. 2A**; and **FIG. 2D** illustrates a Sequence Designation menu displayed when a Sequence Designation item is selected in **FIG. 2C**. Further, **FIG. 3** illustrates a procedure for editing a terminating ring tone in the wireless mobile terminal according to an embodiment of the present invention.

[0020] Now, a terminating ring tone editing method according to an embodiment of the present invention will be described in detail with reference to FIGS. **1** to **3**. It will be assumed herein that a plurality of melodies used for editing the terminating ring tones are stored in the memory **14** in a predetermined sequence. Since the method for storing the melodies in the memory **14** is well known to those skilled in the part, the detailed description will not be provided.

[0021] The controller **10** determines in step **100** whether a terminating ring tone editing key is input by the user. When the terminating ring tone editing key is input by the user, the controller **10** displays the Bell/Melody Selection menu, shown in **FIG. 2A**, on the display **16** in step **104**. If, however, a key input by the user is not the terminating ring tone editing key, the controller **10** proceeds to step **102** and performs an operation corresponding to the key input. The controller **10** determines in step **106** whether the Bell/Melody Editing item is selected by the user. If the Bell/Melody Editing item is selected by the user, the controller **10** displays the Bell/Melody Editing menu, shown in **FIG. 2C**, on the display **16** in step **112**. Otherwise, if the Bell/Melody Editing item is not selected by the user in step **106**, the controller **10** determines in step **108** whether the Melody Selection item is selected by the user. If the Melody Selection item is selected by the user, the controller **10** displays the Melody Selection menu, shown in **FIG. 2B**, on the display **16** in step **126**. Otherwise, if the Melody Selection item is not selected by the user, i.e., if the Bell Selection item is selected by the user in step **108**, the controller **10** proceeds to step **110**. After step **126**, the controller **10** determines in step **128** whether a melody selection key is input by the user. If the melody selection key is input by the user, the controller **10** sets the selected melody for a new terminating ring tone in step **130**, and then ends the procedure.

[0022] After step **112**, the controller **10** determines in step **114** whether the Sequence Designation item is selected by the user. If the Sequence Designation item is selected by the user, the controller **10** displays the Sequence Designation menu, shown in **FIG. 2D**, on the display **16** in step **120**. Otherwise, if the Sequence Designation item is not selected by the user, the controller **10** determines in step **116** whether the Sequence item is selected by the user. If not, the process returns to step **112**. If the Sequence item is selected by the user, the controller **10** stores the melodies in the originally set sequence in step **118**. The process then ends. At this point, upon each incoming call, the controller **10** will output a different melody according to the originally set sequence. After step **120**, the controller **10** stores the sequence of the melodies to be output as the terminating ring tones according to the sequence of the melodies that the user designates using the Sequence Designation menu, in step **121**. The controller **10** determines in step **122** whether a sequence designation end key is input by the user. If the sequence designation end key is input by the user, the controller **10** stores the melodies in the memory **14** in the designated sequence in step **124**, and then ends the procedure, if not, the process returns to step **121**.

[0023] In step **110**, the controller **10** sets the bell selected by the user for a new terminating ring tone. Since the operation of step **110** is not concerned with the bell/melody editing method according to the present invention, the detailed description will not be made.

[0024] The Sequence item of step **116** or the Sequence Designation item of step **114** is selected when the mobile wireless terminal is required to output a selected one of the melodies as the terminating ring tone, sequentially or in the sequence designated by the user, upon receipt of each incoming call. For example, referring to **FIG. 2D**, the mobile wireless terminal outputs the melody #1 "Light Cavalry" upon receipt of an incoming call, and then outputs the melody #2 "Anycall™ Logo Song" upon receipt of a next incoming call, continues through melodies #3-#5 and repeats the designated sequence.

[0025] As described above, the mobile wireless terminal according to the present invention stores a plurality of melodies in its internal memory and outputs a selected one of the melodies sequentially or in the sequence designated by the user, upon receipt of each incoming call, thereby providing various terminating ring tones to the user.

[0026] While the invention has been shown and described with reference to a certain preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A method for editing terminating ring tones in a mobile wireless terminal having a memory in which a plurality of melodies are stored, the method comprising the steps of:

displaying a bell/melody selection menu, when a terminating ring tone editing key is input by a user,

displaying a bell/melody editing menu, when a bell/melody editing item on the bell/melody selection menu is selected by the user;

displaying a sequence designation menu for designating an output sequence of the melodies stored in the memory, when a sequence designation item of the bell/melody editing menu is selected by the user; and

setting the output sequence of the melodies according to the sequence designated by the user, and storing the melodies in the memory in the set output sequence.

2. A method for editing terminating ring tones in a mobile wireless terminal having a memory in which a plurality of melodies are stored, the method comprising the steps of:

displaying a bell/melody selection menu, when a terminating ring tone editing key is input by a user,

displaying a bell/melody editing menu, when a bell/melody editing item of the bell/melody selection menu is selected by the user; and

storing the melodies in the memory in an originally stored sequence, when a sequence item on the bell/melody editing menu is selected by the user.

3. An apparatus for editing terminating ring tones in a mobile terminal having a memory, a key input, and a controller, comprising: a storage area in said memory for storing a plurality of melodies, wherein the controller outputs through a speaker a different one of the plurality of melodies upon receipt of successive incoming calls.

4. The apparatus of claim 3, wherein the controller stores in memory a sequence of the plurality of melodies selected by a user through the key input and outputs through the speaker a different one of the plurality of melodies upon receipt of successive incoming calls in the selected sequence.

* * * * *

US006456852B2

(12) **United States Patent**
Bar et al.

(10) **Patent No.: US 6,456,852 B2**
(45) **Date of Patent: Sep. 24, 2002**

(54) **INTERNET DISTRIBUTED REAL-TIME WIRELESS LOCATION DATABASE**

(75) Inventors: **Abraham Bar**, Palo Alto; **Ravi Rajapakse**, San Francisco; **Mati Wax**, San Ramon; **Oliver A. Hilsenrath**, Almo, all of CA (US)

(73) Assignees: **Trafficmaster USA, Inc.**, Garden Grove, CA (US); **Motorola, Inc.**, Schaumburg, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **08/948,713**

(22) Filed: **Oct. 10, 1997**

Related U.S. Application Data

(63) Continuation-in-part of application No. 08/780,565, filed on Jan. 7, 1997, now Pat. No. 6,026,304.

(51) **Int. Cl.**[7] **H04Q 7/20**

(52) **U.S. Cl.** **455/456**; 455/414; 455/457; 342/357.13; 701/208

(58) **Field of Search** 455/456, 440, 455/415, 433, 414, 417, 404, 457; 342/387, 457, 357.13; 701/300, 207, 208, 211

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,327,144	A *	7/1994	Stilp et al.	455/456
5,512,908	A	4/1996	Herrick	342/387
5,515,378	A	5/1996	Roy, III et al.	370/95.1
5,608,410	A	3/1997	Stilp et al.	342/387
5,959,577	A *	9/1999	Fan et al.	342/357.13
6,026,304	A *	2/2000	Hilsenrath et al.	455/456

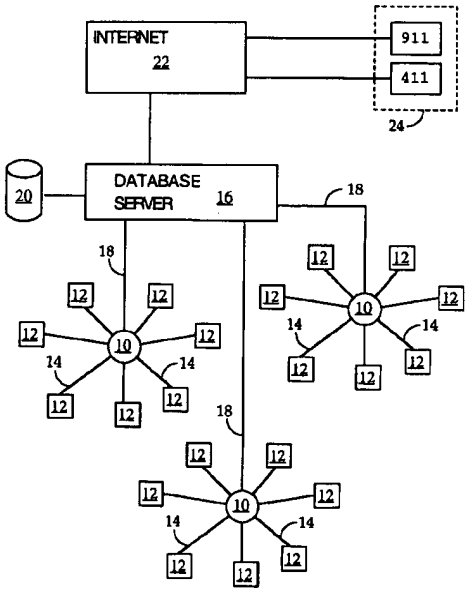
* cited by examiner

Primary Examiner—Nay Maung
(74) *Attorney, Agent, or Firm*—Townsend and Townsend and Crew LLP

(57) **ABSTRACT**

A system for easily and inexpensively distributing real time location information of cellular telephone users to various third party information subscribers comprises an HTTP server machine which maintains a dynamic database of current cellular users. The database has a list of caller entries, where each entry typically comprises a user ID number, such as a phone number, mobile ID number, and/or handset serial ID. The entry also includes, for each user ID number, a user location identifier such as a latitude and longitude, a sector number, a caller or called phone number and/or a street address. The HTTP server is connected to the internet so that registered third party information subscribers have access to the database by means of standard HTTP protocols that ensure authentication and provide encryption for security. Using caller ID or other means for obtaining a caller's phone number, the third party subscriber can obtain, via a simple internet query, the current location of the caller by submitting the phone number to the HTTP server using an HTML form. Standard software on the central server machine verifies the authenticity of the subscriber, looks up the location information in the database, and returns the information to the subscriber. The subscriber can then use the location information to provide any of a wide range of services to the caller, or to dispatch emergency vehicles to the location of the caller. In addition, the server can directly provide many location-based services to callers.

39 Claims, 2 Drawing Sheets



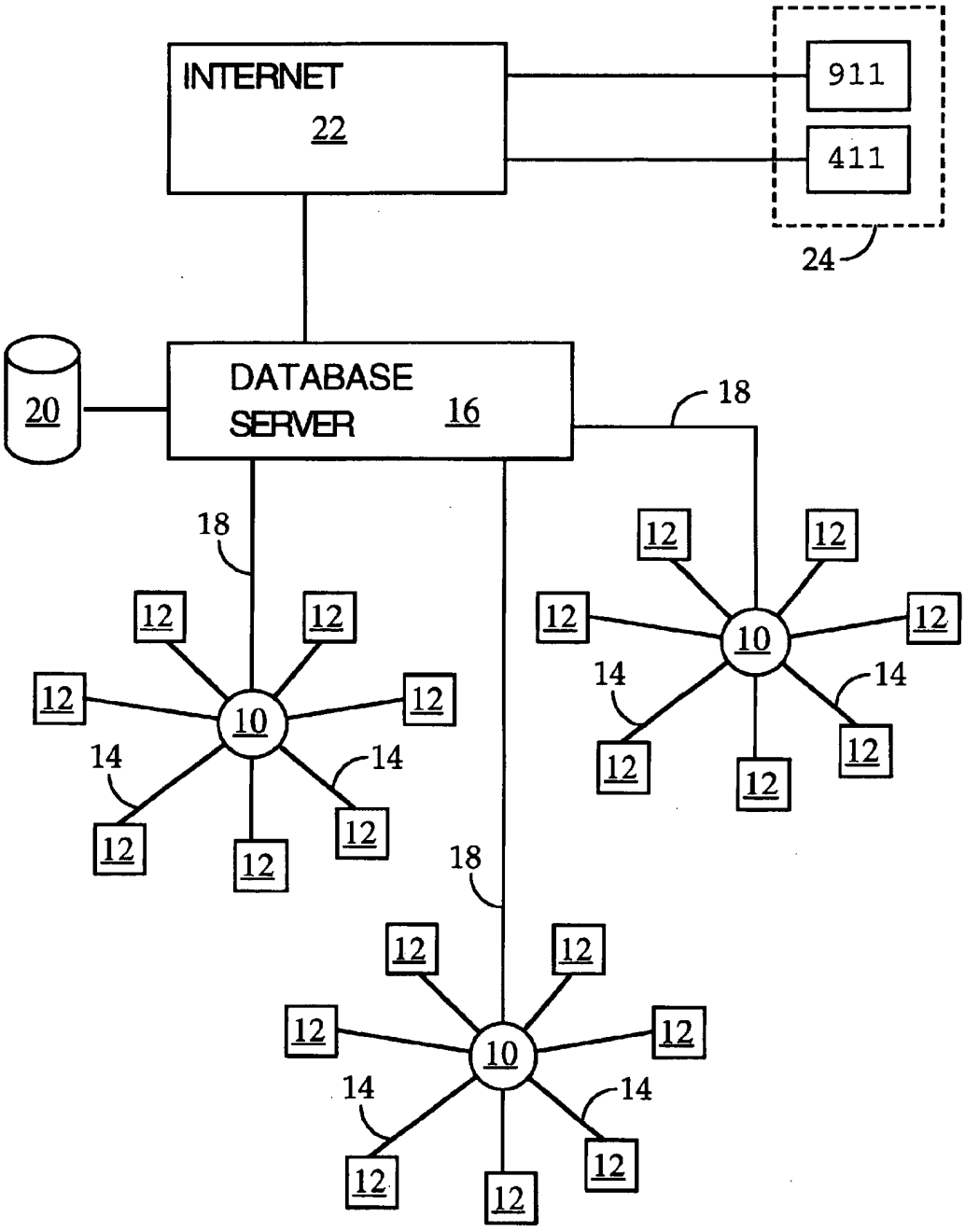


FIG. 1

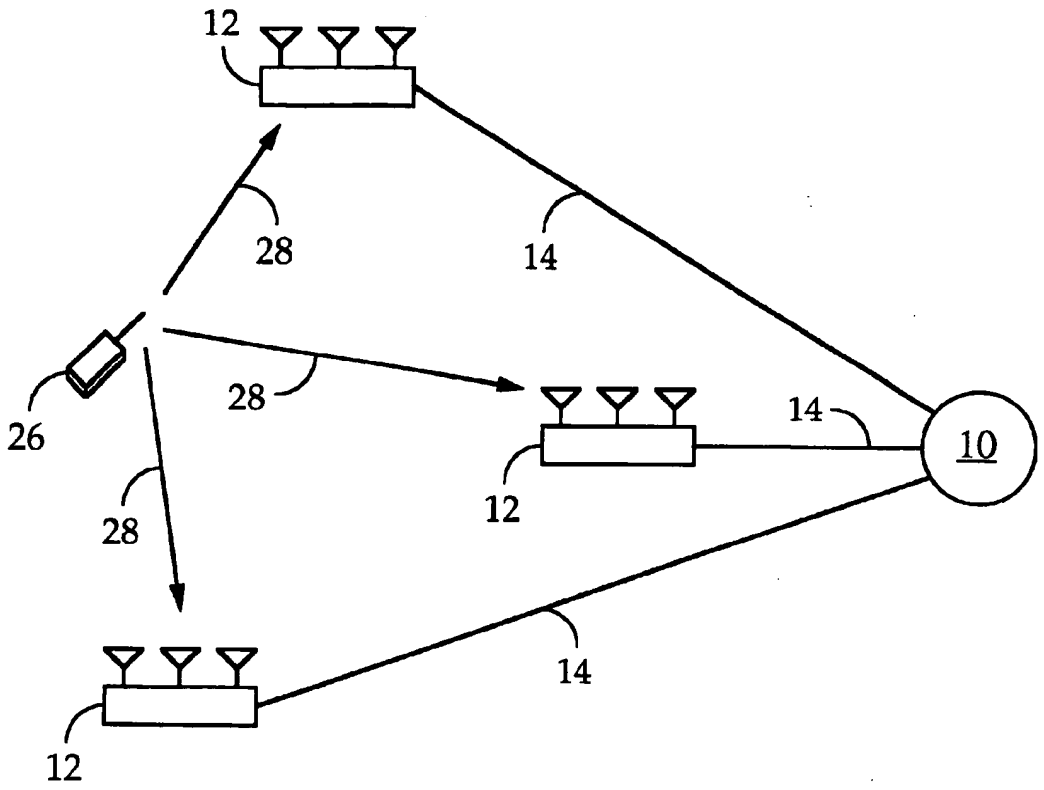


FIG. 2

INTERNET DISTRIBUTED REAL-TIME WIRELESS LOCATION DATABASE

This application is a continuation-in-part of U.S. patent application Ser. No. 08/780,565, filed Jan. 7, 1998, now U.S. Pat. No. 6,026,304, which is incorporated herein by reference.

FIELD OF THE INVENTION

This invention relates generally to cellular telephone network services and management. More specifically, it relates to systems and methods for distributing real-time cellular telephone information in the course of providing location-based services.

BACKGROUND OF THE INVENTION

There are many potential uses of real-time cellular telephone location information. For example, U.S. Pat. No. 5,512,908 to Herrick mentions the application of cellular location information to 911 dispatching, tracking unauthorized cell phone usage, and tracking or locating commercial and/or government vehicles. U.S. Pat. No. 5,327,144 to Stilp et al. also mentions various applications of mobile location information, such as locating lost or stolen vehicles, assisting lost motorists, and dispatching emergency vehicles. These services have not been realized, however, due to several difficulties. First, the conventional methods of location finding, which are based on techniques such as direction finding (DF), time of arrival (TOA), and time difference of arrival (TDOA), cannot accurately and reliably locate transmitters in severe multipath environments. Without reliable location information, it is not possible to provide location based services. A solution to this fundamental problem, however, is disclosed by Hilsenrath et al. in U.S. patent application Ser. No. 08/780,565 now U.S. Pat. No. 6,026,304 which is incorporated herein by reference. Their approach, which takes advantage of multipath signals rather than attempting to mitigate or avoid them, measures a signal signature and determines a location by matching the signature with a calibrated database of signature-location pairs.

Another difficulty facing the realization of location-based services is the expense of communicating the location data to various third party services. In conventional systems, dedicated communication lines are established between the location finding equipment and the third party subscribers in order to transfer the constantly changing location data. Continuously maintaining these lines, especially over long distances, can be very expensive. In addition, if there are many location-based services or many different subscribers, many expensive dedicated lines and/or many differing protocols for communication may need to be devised and deployed to provide the information to each specific location-based service and/or subscriber. The creation and maintenance of these dedicated lines and protocols can be very expensive and inconvenient.

OBJECTS AND ADVANTAGES OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a method for conveniently and inexpensively communicating location information in real time to third party service providers. It is another object of the invention to provide such a method that is simple to use and allows subscribers to be added and deleted easily and inexpensively. It is another object of the invention to provide for the realization of many cellular network services and management applications that have heretofore been unattainable due to the absence of a simple and inexpensive technique for communicating real-time cellular telephone information to service providers. These and other advantages will become apparent from the following description and accompanying drawings

SUMMARY OF THE INVENTION

The present invention provides a system for easily and inexpensively distributing real time location information of cellular telephone users to various third party information subscribers. A dynamic database of current cellular users is created and is maintained at a central server machine. The database has a list of caller entries, where each entry typically comprises a user ID number, such as a phone number, mobile ID number, and/or handset serial ID. The entry also includes, for each user ID number, a user location identifier such as a latitude and longitude, a sector number, a caller or called phone number and/or a street address. Each entry can include additional information as well, such as a current base station for the user and a most recent registration time of the user.

The database is maintained on an HTTP server connected to the internet. Registered third party information subscribers are given access to the database by means of standard HTTP protocols that ensure authentication and provide encryption for security. Using caller ID or other means for obtaining a caller's phone number, the third party subscriber can obtain, via a simple internet query, the current location of the caller by submitting the phone number to the HTTP server using an HTML form. Standard software on the central server machine verifies the authenticity of the subscriber, looks up the location information in the database, and returns the information to the subscriber. The subscriber can then use the location information to provide any of a wide range of services to the caller, or to dispatch emergency vehicles to the location of the caller. In addition, the server can directly provide many location-based services to callers.

DESCRIPTION OF THE FIGURES

FIG. **1** is a schematic diagram of a system according to the present invention.

FIG. **2** is a schematic diagram of a location finding subsystem according to the present invention.

DETAILED DESCRIPTION

Although the following detailed description contains many specifics for the purposes of illustration, anyone of ordinary skill in the art will appreciate that many variations and alterations to the following details are within the scope of the invention. Accordingly, the following preferred embodiment of the invention is set forth without any loss of generality to, and without imposing limitations upon, the claimed invention.

A system for carrying out the invention is shown in FIG. **1**. Hubs **10** determine transmitter locations from transmitter signal information communicated from base stations **12** to hubs **10** via signature communication lines **14**. As pictured, each hub **10** handles several satellite base stations **12** which collectively cover a contiguous geographical region, such as a metropolitan region. Location information determined at hubs **10** is then transmitted to central database server **16** via location communication lines **18**. Central server **16** then combines location information from the different hubs **10** into a single location database **20**. Database **20** is continu-

ously updated by server **16** to contain the most recent location information. Accordingly, database **20** is a dynamic, real-time database containing the present locations of all transmitters within the geographical regions covered by hubs **10** and their respective satellite base stations **12**.

Central server **16** is enabled by conventional hardware and software to act as an HTTP server, and is connected to an internet **22** by standard network hardware and IP protocols. Also connected to internet **22** are various third party subscribers **24** who desire or require location information from database **20** for various uses. For example, cellular caller location information can be used to provide dispatchers with immediate locations for 911 callers under emergency circumstances. Location information also can be used for enhanced 411 service, i.e. for real time caller location associated services, such as providing directions to lost motorists. The location information can be used to provide enhanced 911 response of emergency vehicles by tracking the locations of emergency vehicles, coordinating location information with street map databases, and communicating specific optimal directions to appropriate vehicles. Location information can be used by the cellular phone company for location-based billing of cellular calls and to help combat cellular fraud.

Location information sent from individual base station sites **12** to metro hubs **10** can be used to assist in hand-off between cells, for automatic trunking, for channel borrowing, for channel capacity optimization, to more efficiently allocate cellular frequencies, and to increase the capacity of the metro network. It is a significant feature of the present invention that high bandwidth communication lines are not required to determine and communicate location information within such a network. Accordingly, the present invention enables for the first time the ability to use location information to actively monitor and/or manage all the wireless traffic in a network.

FIG. **2** shows a subsystem of the system shown in FIG. **1**. A cellular phone **26** transmits signals **28** which are received by one or more location finding base stations **12**. Base stations **12** may determine the location of phone **26** by one of, or a combination of, several location finding techniques. In the case where there is not severe multipath, or where accurate location information is not required, any of the conventional methods of location finding may be used. These conventional methods are based on techniques such as direction finding (DF), time of arrival (TOA), and time difference of arrival (TDOA). Typically, signal information is sent from the base stations **12** to the hub **10** for location determination through comparative analysis of the signal information. In the preferred embodiment, the location finding technique disclosed by Hilsenrath et al. in U.S. patent application Ser. No. 08/780,565 now U.S. Pat No. 6,026,304 is used. This technique has the advantage of providing accurate location information even in severe multipath environments. It also has the virtue of being able to determine an accurate location based on signals from just one base station **12**. Nevertheless, through the combination of signal information from several base stations **12**, an even more accurate location may be determined by hub **10**.

In the preferred embodiment, the base stations **12** determine signal signatures and transmit these signatures at periodic intervals to hub **10**. Also transmitted are identifiers associated with each signature, such as a handset phone number or a handset ID number. The signatures and identifiers can be transmitted from base stations **12** to hub **10** by various conventional techniques such as a dedicated phone line, a radio frequency channel, or a computer network connection. In the preferred embodiment, the communication links **14** comprise computer network connections. For example, base stations **12** and hub **10** may each have an inexpensive dial-up connection to an internet service provider, and the signature and identifier data is communicated to the hub through this network connection.

At hub **10** the signatures from the base stations **12** are used to determine transmitter locations by matching the signal signatures with calibrated signatures and corresponding locations stored in a database. Specific techniques for performing this matching, as well as techniques for combining information from several base stations to improve accuracy and reduce ambiguity, are disclosed by Hilsenrath et al. in U.S. patent application Ser. No. 08/780,565now U.S. Pat No. 6,026,304. In an alternate embodiment, each base station **12** performs its own matching to independently determine a location or set of likely locations. This location information is then transmitted to hub **10** instead of, or in addition to, signal signature information.

The location and identifier information at the hubs **10** is sent periodically to the database server **16** over communication links **18** similar to links **14**. Although the hubs **10** and server **16** are distinct in this embodiment, the various hubs **10** are not necessarily distinct from each other or from the database server **16**. In other words, all the base stations **12** may be directly connected to database server **16**, without the use of hubs **10**. Database server **16**, in this case, performs all the tasks of the hubs **10**, as described above.

Irrespective of these system architecture options, however, database server **16** maintains in a memory or other data storage device **20** a dynamic database containing real-time location and identifier data as determined from signals received by base stations **12**. More specifically, the database has a list of entries, where each entry typically comprises a user identifier, such as a handset phone number, mobile ID number, and/or handset serial ID. The entry also includes, for each user identifier, a current user location identifier such as a latitude and longitude or other coordinates, a sector number, and/or a street address. Each entry can include additional information as well, such as a current base station for the user, a most recent registration time of the user, and a most recent update time for the user location.

Central server **16** is configured as an HTTP server with a dedicated connection to the internet **22**. Registered third party information subscribers **24** are given access to the database by means of standard HTTP protocols that ensure subscriber authentication and provide encryption for security. Specifically, the database may be accessed by sending to server **16** an HTTP request to access a URL which makes reference to a cgi-bin executable script. The URL also contains information identifying the user, such as a name or telephone number, whose location is requested. A cgi-bin script located on server **16** determines a user identifier from the user information in the URL, obtains the corresponding real-time location of the user from the database **20**, and returns this location information to the subscriber **24** as an HTML document. Techniques for responding to queries via HTTP search requests, as described above, are well known in the art. Server **16** may perform additional functions to enhance security, such as permit HTTP access only from certain preregistered subscribers, and encrypt information transmitted to and from the subscribers. The server **16** may also selectively limit a subscriber's access to information about particular users. Techniques for configuring HTTP servers to perform functions of this nature are well known in the art.

In a typical application of the present invention, a database subscriber **24** uses caller ID or another technique to

automatically identify a caller. The third party subscriber can then automatically generate a simple search query containing the caller's identifying information, and submit the query to the HTTP server using an HTML form, as described above. The cgi-bin software on the central server machine then verifies the authenticity of the subscriber, looks up in the database the real time location information corresponding to the caller information, and returns the location information to the subscriber. The subscriber can then use the location information to provide any of a wide range of services to the caller, as previously described above.

Certain privileged subscribers may be permitted to download the entire database of user identifiers and locations. For example, a cellular telephone service provider may use location information to perform a statistical analysis of service use as a function of location. Such analysis may help provide improved service to cellular telephone customers. In this situation it may be especially useful to include additional information in the database, such as the last registration time of the user, the base station of the user, and the channel of the user. Such information can be especially useful to such a privileged subscriber. As noted previously, the server can be configured to make such information selectively available only to specific subscribers.

In addition to third-party subscribers, the central server may also be accessed by the users themselves. For example, an organization may find it desirable to have real-time access to the locations of various organization members who are provided with cellular phones and regularly engaged in movement. The organization can access the central server **16** in order to obtain location information of its members. A member can call in to the organizational office, for example, to check in after a task has been completed. The office can then verify the member's location. Note that the automatic registration protocol in certain cellular standards allows the determination of a phone location even when the phone is not in use. In this case, location information can be provided even for users who are not actively using their phones. The server, therefore, may provide additional services such as generating a map indicating the real time locations of all the members of an organization.

In another application of the present invention, an individual using a portable laptop computer equipped with a wireless modem can connect to an internet service provider and directly access the database of server **16**. In this way, the individual's location can be reported directly to the individual. The server may provide various additional location based services to such an individual. For example, the server can provide the user with automatically generated HTML documents containing lists of nearby ATM machines, nearby restaurants, nearby gas stations, or other places of interest. The server can also provide the individual with a detailed road map of the nearby area, indicating on the map the individual's present location. If the user is not equipped with a laptop computer and wireless modem, similar services may be provided through the use of voice recognition and speech synthesis techniques. For example, the user may dial in to a telephone line connected to the server, and the server can provide voice options to the user, e.g. "for the location of gas stations near you, press **1**; for the location of ATM machines near you, press **2**." These options may be user-configurable. Using conventional speech recognition techniques, the user can respond to these options by simply saying "one" rather than using the touch-tone keypad of the telephone handset. These features may also be performed by a third-party subscriber rather than by the central server itself. In this case, the third party subscriber performs all the voice recognition and. speech synthesis interfaces, customization features, etc., while the central server provides the location information to the subscriber via the internet, as discussed above.

In another application of the invention, information or advertisements can be provided to the user based on a present location and/or the user's personal profile. For example, a user who is known to be interested in the theatre can be alerted to the production of a play by a small theatre company in the vicinity of the user, or a user who is known to be interested in consumer electronics can be alerted to a sale taking place that day at a nearby retailer. The user can be alerted to this information upon placing a call in a specific region. The central server, which can maintain a database of such events and their localities, can match a user's interest profile and location with appropriate events and alert the user when a call is placed. In addition, or as an alternative, the server can "push" the information to the user by actively placing an automated phone call to the user upon entering the local area of a matching event. For example, if a user is interested in local traffic or weather conditions, the server can be configured to automatically place a call to the user upon entering a local area where a traffic or weather advisory is in effect. As noted above, through the use of the periodic registration protocols of A certain cellular standards, the server can determine the location of a user even when no call is being made.

In a further application of the present invention, the server can be configured by the user to automatically take specific actions based on the location of the user. For example, the user may program the system to send a voice mail, an e-mail, or place an automated phone call to a predetermined number when the user arrives or leaves from a certain location. Specifically, a user might program the server to make a call to a home phone number to alert family members of the user's arrival. Or the server might be programmed to alert a central office when a delivery person has arrived at a delivery location. Clearly, there are many other similar applications of the present invention.

Third party subscribers may use various techniques to identify callers. The widespread caller-ID feature of most telephone systems can be integrated into a subscriber's system to automatically identify a caller. Another technique for automatic identification of callers is to compare the voice signal of the caller with voice signals captured at the bases **12**. By matching the caller's voice with one of the captured voice signals, the caller can be identified automatically. Alternatively, a caller can manually identify himself or herself by typing in a code number on the telephone keypad.

It will be apparent from the foregoing examples that many variations and alterations to the details are possible without departing from the general spirit and scope of the invention.

What is claimed is:

1. A method for providing real-time location based services, the method comprising:

collecting signals from each of a plurality of mobile transmitters at one or more base stations;

determining from the received signals a plurality of corresponding transmitter locations by matching the received signals from each of said plurality of mobile transmitters with one or more of a plurality of stored signals, the stored signals representing a plurality of specific locations;

storing the transmitter locations in a database at a server machine; and

providing a subscriber with access to the databases via a computer network connection.

2. The method of claim 1 wherein the providing step further comprises the steps of:

said subscriber sending an HTTP query via an internet connection to said database at said server machine; and

said server machine sending a response to said HTTP query back to said subscriber via said internet connection.

3. The method of claim 1 wherein the providing step comprises adjusting the accessibility to portions of the database in dependence upon the subscriber.

4. The method of claim 1 wherein the storing step further comprises storing user identifiers in the database.

5. The method of claim 1 further comprising generating at the server customized information based on the transmitter locations, and providing the customized information to the subscriber.

6. The method of claim 1 further comprising performing at the server a preprogrammed action based on the transmitter locations.

7. The method as recited in claim 1, wherein a first one of said one or more base stations generates location information for one of said plurality of mobile transmitters and a second one of said one or more base stations generates location information for said one of said plurality of mobile transmitters, and wherein said location information from said first one of said one or more base stations is compared to said location information from said second one of said one or more base stations to obtain a more accurate location for said one of said plurality of mobile transmitters.

8. The method as recited in claim 7, wherein the determining step further comprises the step of matching the received signals from each of said plurality of mobile transmitters with one or more stored signals associated with a particular location.

9. The method as recited in claim 7, wherein a first one of said one or more base stations generates location information for one of said plurality of mobile transmitters and a second one of said one or more base stations generates location information for said one of said plurality of mobile transmitters, and wherein said location information from said first one of said one or more base stations is compared to said location information from said second one of said one or more base stations to obtain a more accurate location for said one of said plurality of mobile transmitters.

10. The system of claim 1, wherein the mobile transmitters are wireless telecommunications devices and the real-time location based services are 911 emergency services provided by the subscriber to users of the devices.

11. The system of claim 1, wherein the mobile transmitters are wireless telecommunications devices and the real-time location based services are enhanced 411 caller location services provided by the subscriber to users of the devices.

12. A system comprising:

a plurality of base stations, each of which comprises means for receiving signals from a plurality of mobile transmitters, and means for comparing the received signals with one or more of a plurality of stored signals in order to determine locations corresponding to each of said plurality of mobile transmitters, the stored signals representing a plurality of specific locations; and

a server machine comprising means for receiving from the base stations the transmitter locations, means for storing the transmitter locations in a database, and means for providing a subscriber with access to the database via a data network connection.

13. The system of claim 12 wherein the server comprises means for responding to subscriber HTTP queries via an internet connection.

14. The system of claim 12 wherein the server comprises means for adjusting the accessibility to portions of the database in dependence upon the subscriber.

15. The system of claim 12 wherein the database further contains user identifiers.

16. The system of claim 12 further comprising means for generating at the server customized information based on the transmitter locations, and means for providing the customized information to the subscriber.

17. The system of claim 12 further comprising means for performing at the server a preprogrammed action based on the transmitter locations.

18. The system as recited in claim 12, wherein a first one of said plurality of base stations generates location information for one of said plurality of mobile transmitters and a second one of said one or more base stations generates location information for said one of said plurality of mobile transmitters, and wherein said location information from said first one of said one or more base stations is compared to said location information from said second one of said one or more base stations to obtain a more accurate location for said one of said plurality of mobile transmitters.

19. A method for providing real-time location based services, comprising the steps of:

collecting signals from each of a plurality of mobile transmitters at one or more base stations;

determining the location of said plurality of mobile transmitters from signals received at said one or more base stations, wherein the location of each of said plurality of mobile transmitters is determined from signals received at less than three of said one or more base stations;

storing the location of said plurality of mobile transmitters in a database at a server machine; and

providing a subscriber with access to the databases via a computer network connection.

20. A method for providing real-time location based services to a subscriber via a computer network, comprising the steps of:

collecting signals from a plurality of mobile transmitters;

determining from the received signals a plurality of corresponding transmitter locations, by comparing the received signals with a plurality of calibrated stored signals, the calibrated stored signals representing a plurality of specific locations;

storing the transmitter locations in a database at a server machine;

said subscriber sending an HTTP query via an internet connection to said database at said server machine; and

said server machine sending a response to said HTTP query back to said subscriber via said internet connection.

21. The method as recited in claim 20, wherein said subscriber is a third-party subscriber.

22. The method as recited in claim 20, wherein said subscriber is an owner of one of said plurality of mobile transmitters.

23. A method for providing real-time location based services to a subscriber, comprising the steps of:

collecting signals from a plurality of mobile transmitters;

determining from the received signals a plurality of corresponding transmitter locations by comparing the collected signals with a plurality of calibrated stored signals, the calibrated stored signals representing a plurality of specific locations;

storing the transmitter locations in a database at a server machine;

generating at the server customized information based on the transmitter locations, and

providing the customized information to the subscriber.

24. A system comprising:

a plurality of base stations, each of which comprises means for receiving signals from a plurality of mobile transmitters, and means for determining from the received signals locations corresponding to each of said plurality of mobile transmitters by matching the received signals from said plurality of mobile transmitters with a plurality of stored signals representing a plurality of specific locations; and

a server machine comprising means for receiving from the base stations the transmitter locations, means for storing the transmitter locations in a database, and means for providing a subscriber with access to the database via a data network connection.

25. The system as recited in claim **24**, wherein a first one of said base stations generates location information for one of said mobile transmitters and a second one of said base stations generates location information for said one of said mobile transmitters, and wherein said location information from said first one of said base stations is compared to said location information from said second one of said base stations to obtain a more accurate location for said one of said mobile transmitters.

26. A system for providing location based services to subscribers, comprising:

a plurality of base stations associated with a hub, the base stations and hub receiving signals from a plurality of mobile transmitters and comparing the received signals with a plurality of matching calibrated signals in order to determine locations corresponding to each of said plurality of mobile transmitters, the matching calibrated signals representing a plurality of specific locations; and

a server machine receiving from the base stations and hub the transmitter locations, storing the transmitter locations in a database, and responding to HTTP queries received from subscribers via a data network connection.

27. The system of claim **26**, wherein the mobile transmitter signals are received at the base stations and compared at the hub.

28. The system of claim **26**, wherein the mobile transmitter signals are received and compared at the base stations and the transmitter locations are received by the server machine through the hub.

29. A system for providing location based services to subscribers, comprising:

a plurality of base stations, each of which comprises means for receiving signals from a plurality of mobile transmitters, and means for determining, from the received signals and a plurality of stored signals representing a plurality of specific locations, a plurality of corresponding transmitter locations; and

a server machine comprising means for receiving from the base stations the transmitter locations, means for storing the transmitter locations in a database, means for generating customized information based on the location of the mobile transmitters, and means for providing the customized information to subscribers.

30. The system as recited in claim **29**, wherein the subscribers are third-party subscribers.

31. The system as recited in claim **29**, wherein the subscribers are owners of said mobile transmitters.

32. The system of claim **29**, wherein the means for determining uses less than three received signals from each mobile transmitter to determine the corresponding transmitter location.

33. The system of claim **32**, wherein the means for determining uses a single received signal from mobile transmitter to determine the corresponding transmitter location.

34. A method for providing real-time location based services, the method comprising:

collecting signals from each of a plurality of mobile transmitters at one or more base stations;

determining from the collected signals a plurality of corresponding transmitter locations by applying a non-triangulation method using collected signals at less than three base stations and using one or more calibrated stored signals associated with each transmitter location;

storing the transmitter locations in a database at a server machine; and

providing a subscriber with access to the databases via a computer network connection.

35. The method of claim **34** wherein the non-triangulation method uses collected signals at a single one of the base stations.

36. The method of claim **35**, wherein the non-triangulation method compares a collected signal to one or more calibrated stored signals.

37. A method for providing real-time location based services, comprising the steps of:

collecting signals from each of a plurality of mobile transmitters at one or more base stations;

determining the location of each of said mobile transmitters from signals received at said one or more base stations, wherein the location of each of said mobile transmitters is determined from less than three signals collected from each of said mobile transmitters;

storing the location of said plurality of mobile transmitters in a database at a server machine; and

providing a subscriber with access to the databases via a computer network connection.

38. The method of claim **37**, wherein the location of each of said mobile transmitters is determined by a single signal collected from each of said mobile transmitters.

39. A method for providing real-time location based services, the method comprising:

collecting signals from each of a plurality of mobile transmitters at one or more base stations;

determining from the received signals a plurality of corresponding transmitter locations by matching the received signals from each of said plurality of mobile transmitters with one or more of a plurality of stored signals, the stored signals representing a plurality of precise locations;

storing the transmitter locations in a database at a server machine; and

providing a subscriber with access to the databases via a computer network connection.

* * * * *

US006094587A

United States Patent [19]

Armanto et al.

[11] **Patent Number: 6,094,587**

[45] **Date of Patent: Jul. 25, 2000**

[54] **PROGRAMMING OF A TELEPHONE'S RINGING TONE**

[75] Inventors: **Taneli Armanto**, Paimio; **Vesa Ylitolva**, Salo; **Jani Leppalammi**, Pirkkala, all of Finland

[73] Assignee: **Nokia Mobile Phones Ltd.**, Espoo, Finland

[21] Appl. No.: **08/995,795**

[22] Filed: **Dec. 22, 1997**

[30] **Foreign Application Priority Data**

Dec. 30, 1996 [FI] Finland 965265

[51] **Int. Cl.**[7] **H04B 1/38**

[52] **U.S. Cl.** **455/567**; 379/374

[58] **Field of Search** 455/550, 567; 379/372, 373, 374

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,866,766	9/1989	Mitzlaff	379/374
4,868,561	9/1989	Davis	340/825.44
5,153,829	10/1992	Furuya et al.	364/419
5,404,580	4/1995	Simpson et al.	455/89
5,452,354	9/1995	Kyronlahti et al.	379/375
5,930,352	7/1999	Hiraiwa	379/387
5,940,767	8/1999	Bourgeois et al.	455/466
5,943,399	8/1999	Bannister et al.	379/88.17

FOREIGN PATENT DOCUMENTS

0684591 A1	11/1995	European Pat. Off. .
2301261	11/1996	United Kingdom .
WO 92/03891	3/1992	WIPO .
WO 96/06417	2/1996	WIPO .

OTHER PUBLICATIONS

European Telecommunication Standard, ETS 300 511 "European Digital Cellular Telecommunications System-(Phase 2); Man–Machine Interface (MMI) Of The Mobile Station (MS) (GSM 02.30)", Jul. 1995.
TS GSM 02.04.
TS GSM 02.90.
TS GSM 03.38.
TS GSM 03.40.

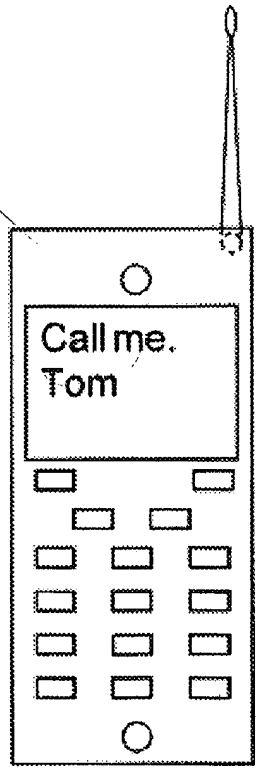
Primary Examiner—Reinhard J. Eisenzopf
Assistant Examiner—N Mehrpour
Attorney, Agent, or Firm—Perman & Green, LLP

[57] **ABSTRACT**

The present invention relates to a method for programming a ringing tone of a telephone, wherein, in the telephone, the ringing tone is stored in a ringing tone memory and reproduced by means of sound reproduction devices as a response to an incoming call. In the method, the ringing tone is transformed into characters containing specifications of notes and the characters are sent to the telephone, e.g., in a short message. In the telephone, the received characters are modified into such a form that they can be stored in a memory.

10 Claims, 5 Drawing Sheets

- user can send ringing tones from a computer through the internet to a second mobile station in response to an incoming call



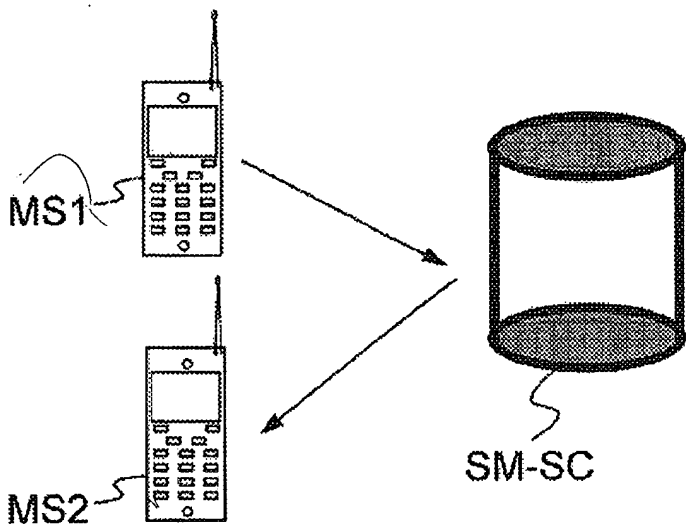


Figure 1

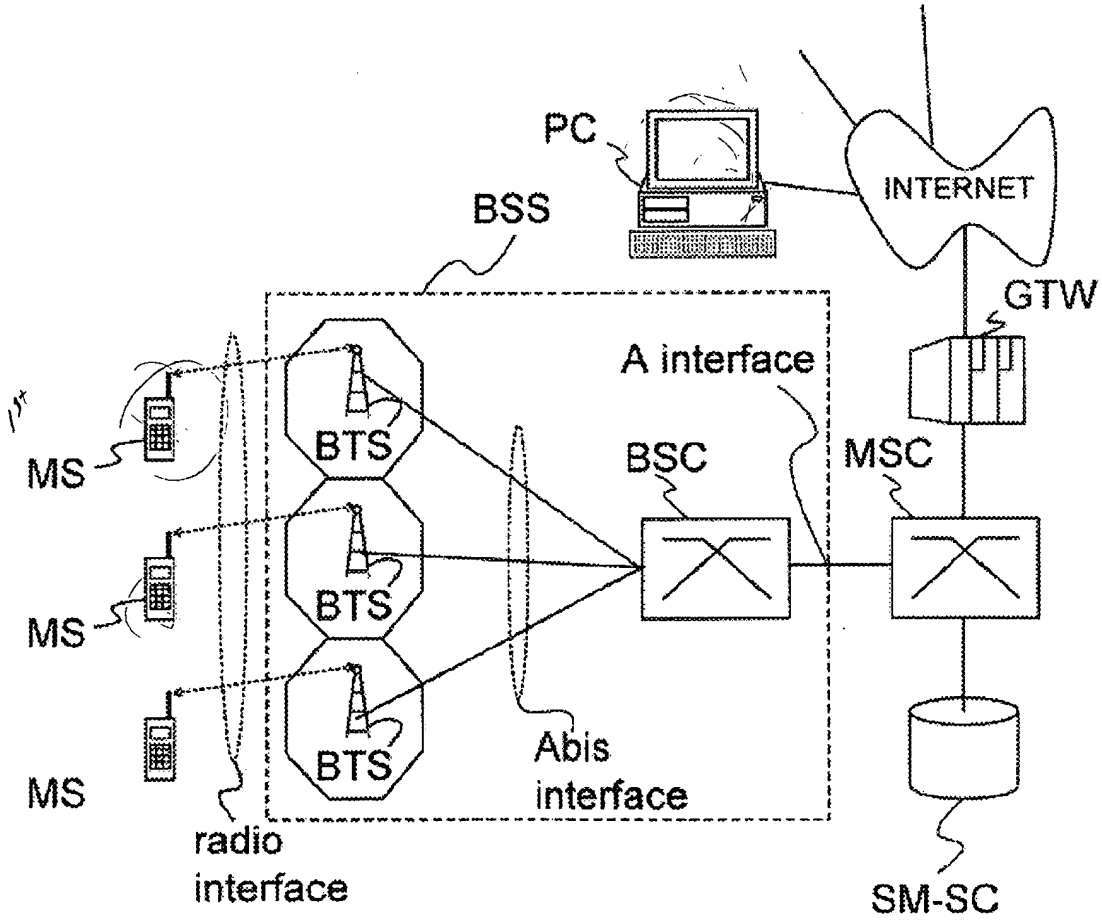


Figure 2

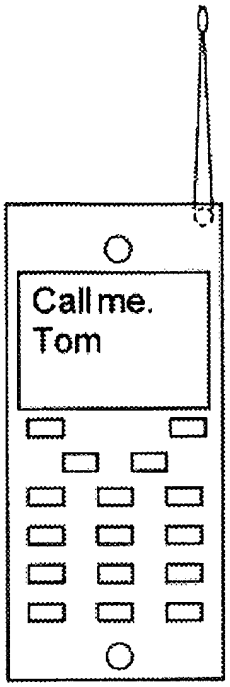


Figure 3

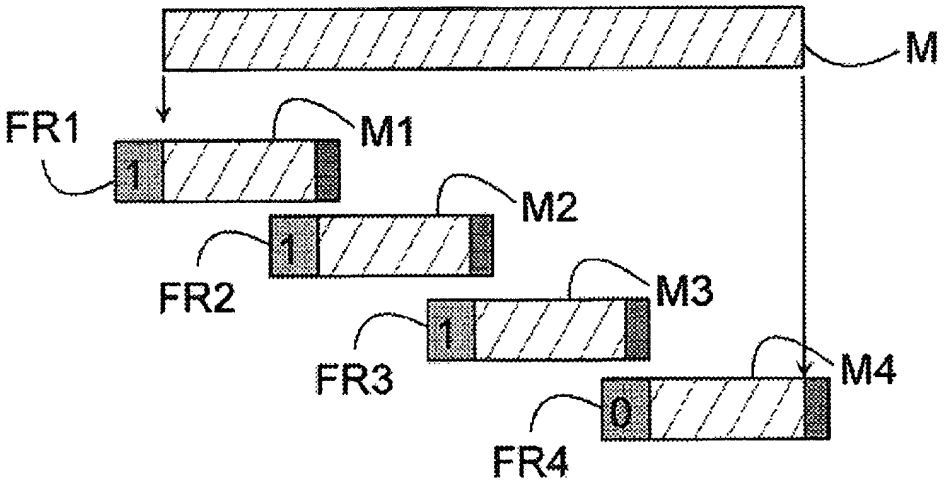


Figure 4a

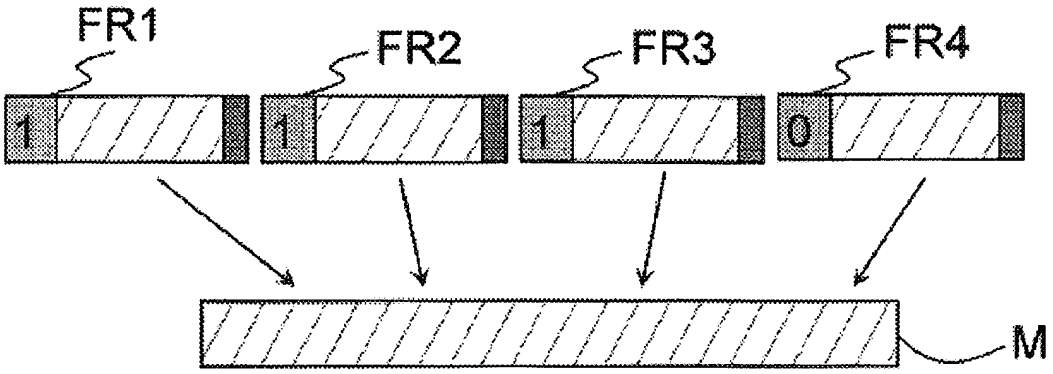


Figure 4b

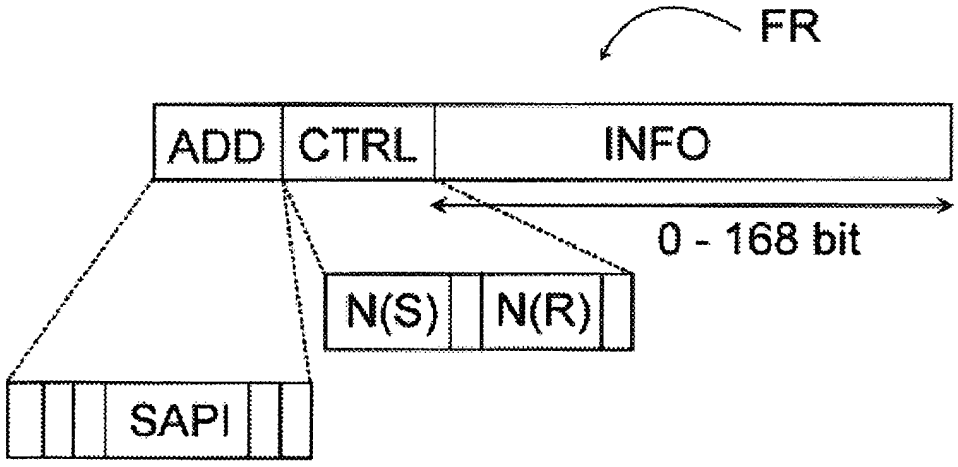


Figure 5

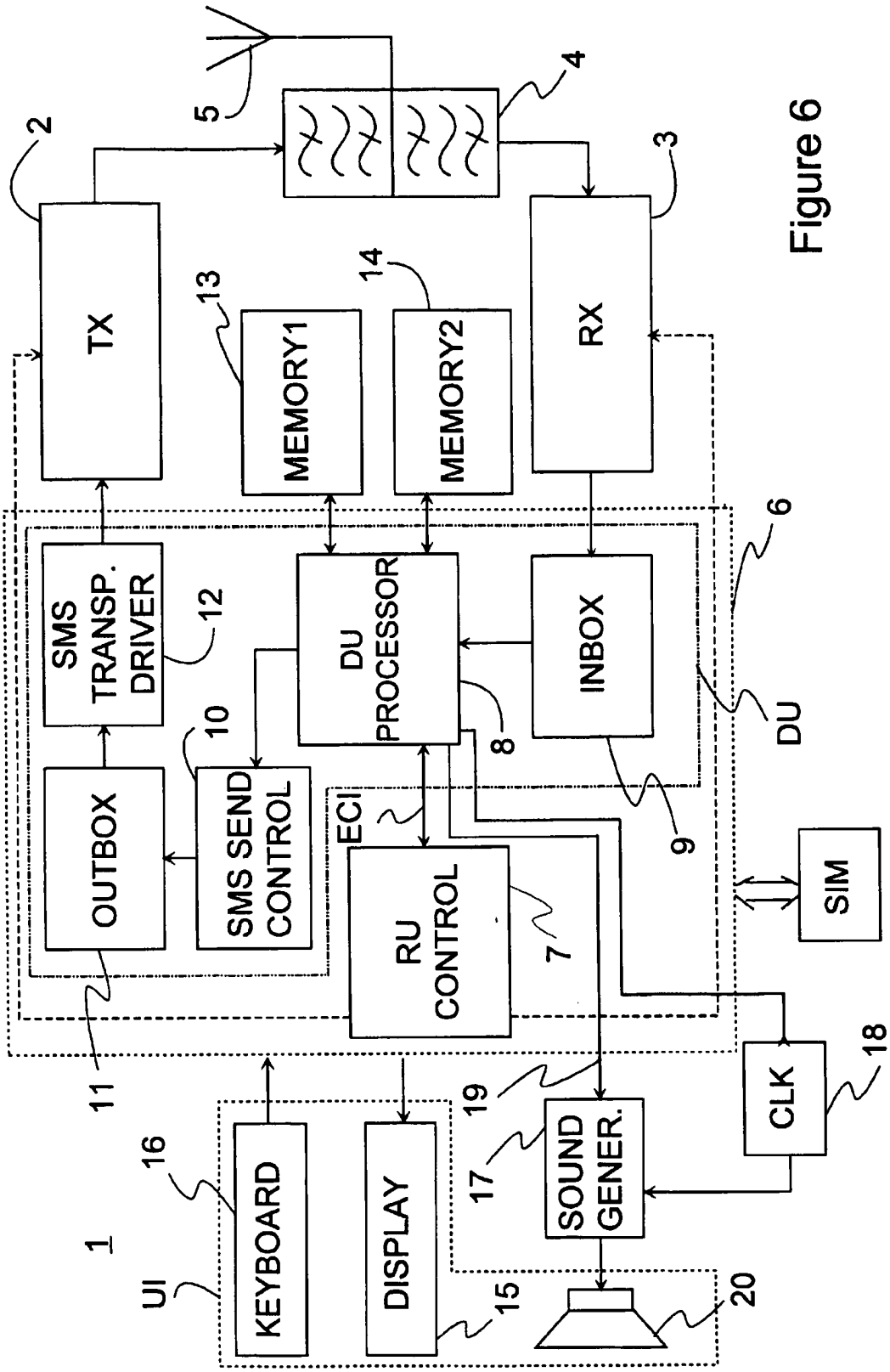

TX
RX
MEMORY1
MEMORY2
SMS TRANSP. DRIVER
DU PROCESSOR
INBOX
OUTBOX
SMS SEND CONTROL
RU CONTROL
ECI
DU
SIM
CLK
SOUND GENER.
KEYBOARD
DISPLAY
UI
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Figure 6

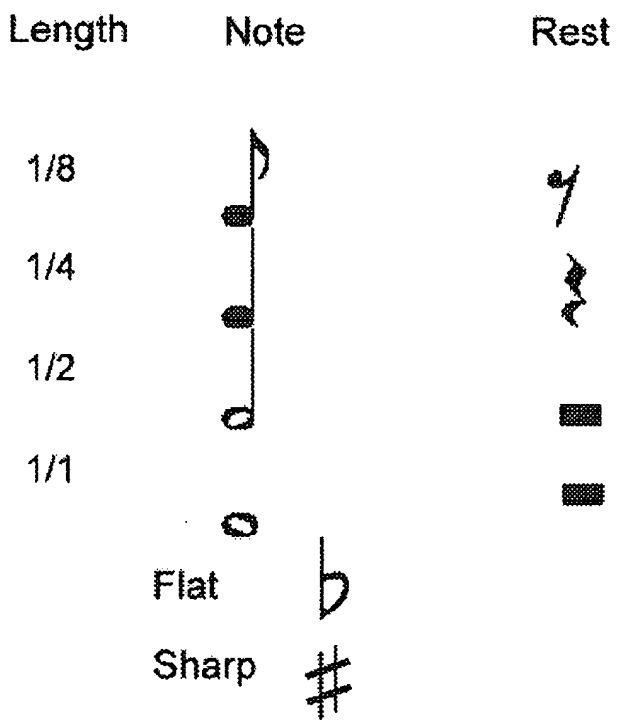


Figure 7a

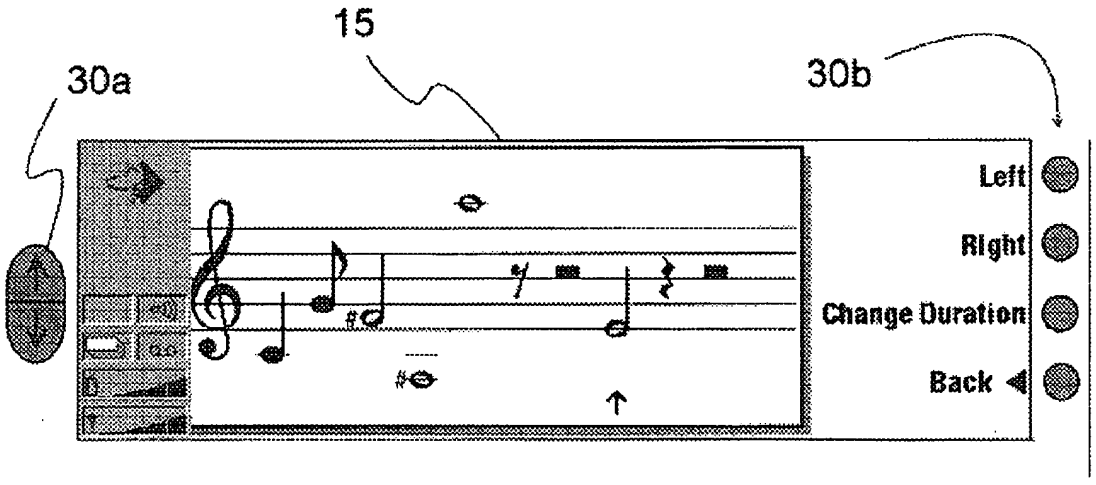


Figure 7b

PROGRAMMING OF A TELEPHONE'S RINGING TONE

FIELD OF THE INVENTION

The present invention relates to a method for programming a telephone's ringing tone, wherein, in the telephone, the ringing tone is stored in a ringing tone memory and reproduced by means of sound reproduction means as a response to an incoming call. The invention also relates to a mobile station and a mobile communications system, which comprises a mobile communications network and at least one mobile station for wireless communication and the system having means for transmitting and receiving speech, a memory for storing a ringing tone and means for reproducing the ringing tone as a signal of an incoming call.

BACKGROUND OF THE INVENTION

Mobile phones have originally had ringing tones similar to ordinary telephones, which have mainly resembled the ringing of a clock. When a mobile phone of a specific make and model had one fixed ringing tone problematic situations occurred, when two users in the same space had the same type of mobile phone and, thus, the same kind of ringing tone, in which case it was confusing as to whose phone was actually ringing. This problem has been solved by making the ringing tone dependent on either the user's own telephone number or the telephone number of a caller. However, the ringing tones produced on the basis of two almost identical telephone numbers may sound so much alike, that it is difficult to distinguish one ringing tone from the other. In addition, by producing a ringing tone on the basis of a telephone number, ringing sound effects with different tones are mainly achieved, which may even annoy the user, i.e., the user is not allowed to select a ringing tone to his/her liking.

This problem has been solved further as mobile phones have become more advanced. Currently, mobile phones normally have several pre-stored ringing tones from amongst which the user may select the preferred ringing tone. In addition to ordinary ringing tones, melodies from familiar pieces of music have been implemented as ringing tones by means of modern technology, and they are also amongst the ringing tones to choose from. With the enormous increase in the use of mobile phones, it has turned out that even as many as ten different ringing tones in a mobile phone are not enough to solve the problem of several mobile phone users thinking that it is their phone ringing, when someone else's phone is ringing. In addition, it may be that the user does not like any of the pre-stored ringing tones. Ordinary telephones, which have a limited number of different types of ringing tones, often present a similar problem.

This situation has been improved by enabling ringing tones to be programmed by means of a user interface of a telephone or other communication device. One solution has been presented in U.S. Pat. No. 4,866,766, wherein a user can input in a telephone different kinds of parameters, which define a ringing tone sequence, in the form of a pulse, such as frequency, pulse length, the number of pulses in a group, period between pulses, the number of pulse groups etc. These parameters are input as different numbers. Another kind of solution has been presented in Publication WO 92/03891, wherein a ringing tone of a paging device can be programmed by switching on or illuminating specific pixels on a matrix display. The position of the pixels in the vertical direction corresponds to a specific pitch of a note (E, F, G, A, H, C, D) and the duration of a note is determined according to the successive pixels. Another corresponding solution has been presented in Publication EP 684 591 A1, wherein it is possible to program, on a display of a paging device, a ringing tone so that the pitch of a note is displayed on the display as a letter symbol (DO, RE, MI, FA, SO, LA, TI) and the duration of a note can be modified as a sequence of a number of the same letter symbols. Due to the defects of the solutions presented above, regarding the programming of a ringing tone, a solution has been presented in Finnish Patent Application 960858, submitted on Feb. 23, 1996, wherein it is possible, e.g., to program a ringing tone as notes by inputting the notes graphically on a stave, displayed on a display, directly in the form of graphic notes.

However, the programming of ringing tones through a user interface has its disadvantages. A user has to take the trouble to input different kinds of parameters, characters or notes in different ways. In addition, in many of the examples presented above, the user is supposed to have a knowledge of music theory in order to produce a specific melody in his/her telephone.

SUMMARY OF THE INVENTION

To facilitate the programming of a ringing tone, a solution has been presented in U.S. Pat. No. 4,868,561, wherein an owner of a paging device can obtain a new ringing tone for the paging device by air. This is accomplished so that the owner of the paging device phones a paging system operator, informs the identifier of the paging device (telephone number) and selects a desired ringing tone from a catalogue he/she already has and informs the paging system operator the identifier of the ringing tone in question. In this case, a paging transmitter first prepares the paging device for the changing of the ringing tone by sending the paging device a message of the changing of the ringing tone and, after that, the paging transmitter sends a ringing tone sequence, whereupon the paging device replaces the ringing tone sequence stored in the memory with the new ringing tone sequence received by air.

A disadvantage of the solution for programming a ringing tone, as presented above, is that a user must separately contact a paging transmitter that operates different ringing tones, and the user can only obtain those ringing tones found at the paging transmitter and in the user's catalogue, and the identifier of which is thus known to him/her. In addition, the paging device cannot simultaneously receive a paging message, because the transmission of a ringing tone sequence keeps the channel engaged at that moment. Correspondingly, a disadvantage is that only the paging system operator is capable of implementing the programming, i.e., transmitting the ringing tone sequence by air. In addition, the paging device (its ringing tone memory) must first be prepared for the changing of the ringing tone, which requires an additional transmission.

Another solution concerning sending audio over the air has been disclosed in publication WO 96/06417, which discloses a paging system in which the transmitter may include an audio composition in a paging message sent to a pager. Upon receipt of the message at the pager, the pager provides a normal audio alert and when the user reads the message, the message data is shown on the display and the audio composition that was included in the message is reproduced by an audio transducer for enhancing the presentation of information by blending audio and visual information. The publication does, however, not suggest programming of the audio alert, i.e. the ringing tone of the pager.

The present invention comprises a device and a method therefor, for programming a ringing tone, which increases the possibility of programming a ringing tone. In the method, the ringing tone is sent to a mobile station in the form of a ringing tone message including an identifier identifying the message as a ring tone and, in reception, the ringing tone message is identified on basis of the ring tone identifier, whereafter it is modified into a suitable form for a ringing tone generator and memory. The ringing tone is preferably transmitted by means of wireless communication. In this case, the ringing tone can be sent directly to the receiving device without any pre-warning and without first preparing the ringing tone memory for the incoming ringing tone. The ringing tone can be sent as a mobile data call through a voice channel or apart from the voice channel. Apart from the voice channel, the ringing tone can be sent as characters in a short message, in USSD (Unstructured Supplementary Service Data) or by means of an off-line infrared link, e.g., of IrDa type. The USSD has been specified in more detail in GSM specifications, e.g., in the following documents: TS GSM 02.04, TS GSM 02.30, TS GSM 02.90, TS GSM 03.38, TS GSM 03.40. A mobile station according to the present invention has means for detecting a ring tone identifier in the message and for modifying a received ringing tone message for a ringing tone generator and a ringing tone memory. Correspondingly, the mobile station according to the present invention may have means for modifying a ringing tone, stored in a ringing tone memory, so that it can be sent to a second mobile station. For transmission the mobile station has means for adding a ring tone identifier in the message. The ringing tone is preferably sent as note data, in which case, in reception, the note data are modified into notes that specify the ringing tone.

The present invention concerns a mobile communications systems with mobile stations and a mobile station for wireless communication, which have means for transmitting and receiving speech, a memory for storing a ringing tone, and means for reproducing the ringing tone as a signal of an incoming call, and being wherein they comprise means for modifying the ringing tone, stored in the memory, into characters and for sending said characters, and means for sending said characters with a ringing tone identifier identifying the transmission as a ringing tone transmission.

Also the present invention concerns a mobile communications system with mobile stations and a mobile station for wireless communication, which have means for transmitting and receiving speech, a ringing tone memory for storing a ringing tone, and means for reproducing the ringing tone as a signal of an incoming call, being wherein they comprise means for receiving messages with characters, means for detecting a ringing tone identifier in a received message informing the message is a ringing tone, means for receiving a ringing tone as characters, and means for modifying said characters into a form for being stored in the ringing tone memory.

Further the present invention concerns a method for programming a ringing tone of a telephone, wherein a ringing tone is stored in a memory and reproduced by means of sound reproduction means as a response to an incoming call, and the method being wherein the ringing tone is modified into characters and sent to the telephone as characters with a ringing tone identifier identifying the transmission as a ringing tone transmission.

Yet the present invention concerns a terminal for data transmission, the terminal comprising a ringing tone memory for storing a ringing tone and means for transmitting the ringing tone, wherein it comprises means for transforming the ringing tone into characters and for sending said characters, and means for sending said characters with a ringing tone identifier identifying the transmission as a ringing tone transmission.

In a first embodiment of the invention, a ringing tone is sent as characters in a short message. When the ringing tone is sent to a mobile station in a short message, the message does not keep a voice channel engaged and, thus, a user can be talking on the mobile station at the same time. The short message is stored in a memory on a transmission channel, in which case the ringing tone will be transmitted to the mobile station even if the mobile station is engaged or switched off during transmission.

A ringing tone can also be sent in a short message from a computer through the Internet. Thus, users of a mobile station can send ringing tones to each other. The ringing tone is preferably sent as note data in the form of characters in a short message. A receiving mobile station receives the short message as an ordinary short message, no pre-warning of the incoming message is required. The short message has a predetermined identifier on the basis of which the receiving mobile station identifies it as a ringing tone and stores it in a ringing tone memory. In addition, in a mobile station according to the present invention, it is preferably possible to program by oneself ringing tones by means of a user interface, in which case users can send each other ringing tones programmed by themselves or other ringing tones stored in the mobile station's memory. Thus, the received ringing tone, stored in the memory, can also be modified by means of the user interface.

The invention simplifies the programming of a ringing tone, when a user of a mobile station does not have to perform operations in order to obtain a new ringing tone, i.e., it is neither necessary to program the ringing tone by means of a user interface nor to prepare the mobile station for receiving the ringing tone, but they can be received directly by means of wireless communication. In addition, the invention increases the possibilities of programming a ringing tone, when the user can receive ringing tones from a second user. As the ringing tone message includes a ringing tone identifier, reception of the ringing tone is easy, as the mobile station will itself identify the received message as a ringing tone without necessity of the user to be involved.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the invention will be discussed in detail by referring to the enclosed drawings, in which

FIG. 1 illustrates the flow of a short message from a mobile station to a second mobile station,

FIG. 2 illustrates connections of a mobile communications system to a short message service centre,

FIG. 3 illustrates a user interface of an ordinary mobile station,

FIG. 4*a* illustrates segmenting of a message into frames in transmission,

FIG. 4*b* illustrates reconstruction of a message in reception,

FIG. 5 illustrates a structure of a short message frame,

FIG. 6 illustrates implementation and operation of a mobile station, according to the present invention, when transmitting a ringing tone and receiving a short message,

FIG. 7*a* illustrates notes produced on a display of a mobile station according to the present invention, and

FIG. 7*b* illustrates an example of a display of a mobile station for producing a ringing tone.

DETAILED DESCRIPTION

In order to understand the first embodiment of the invention, the transmission and reception of a short message will be discussed in the following.

In digital mobile communications systems, as in the GSM system, in addition to calls and data transmission, it is also possible to send short text messages, so-called short messages. In the GSM system, this is known as the SMS (Short Message Service). By means of a mobile station, text messages can be both received from and transmitted to a second mobile station. One of the advantages of the short message service of the GSM system is also that a short message can be sent or received at the same time as an ordinary circuit-coupled communication is open, e.g., during a call. Thus, the transmission of a short message does not keep the mobile station engaged in case of a possible incoming call.

The advantage of short messages as compared to telephone calls is that they can be sent to a receiver although the receiver cannot be contacted at the time the message is being transmitted. This has been implemented by dividing the transmission of the short message, from a first mobile station to a second mobile station, into two parts as illustrated in FIG. **1**: from a transmitting mobile station MS1 to a SM-SC (Short Message Service Centre), wherein the short message is stored and sent further to the actual destination, i.e., to a receiving mobile station MS2, as soon as contacted. In FIG. **2**, the connection of the short message service centre SM-SC to a mobile communications system has been illustrated in more detail. In the following, the transmission and flow of short messages between different interfaces will be discussed by referring to FIGS. **1–5**.

FIG. **2** illustrates the structure of a mobile communications system and connections for transmitting short messages. Mobile stations MS are connected to base stations BTS by means of radio communication. The base stations BTS are further connected, through a so-called Abis interface, to a base station controller BSC, which controls and manages several base stations. The entity formed by a number of base stations BTS (typically, by a few dozen base stations) and a single base station controller BSC, controlling the base stations, is called a base station system BSS. Particularly, the base station controller BSC manages radio communication channels and handovers. On the other hand, the base station controller BSC is connected, through a so-called A interface, to a mobile services switching centre MSC, which co-ordinates the formation of connections both from and to mobile stations. A further connection is made, through the mobile service switching centre MSC, to outside the mobile communications network. The aforementioned short message service centre SM-SC is coupled to the mobile services switching centre MSC.

When a user wants to send a short message by means of the mobile station MS1 (FIG. **1**), he/she writes or retrieves from the memory a message to be transmitted (using a user interface of the mobile station) and gives the phone number of a mobile station MS2, i.e., an identifier of the mobile station MS2, whereto the message is going to be transmitted. In addition, the mobile station should have the contact information, i.e., the phone number of the short message service centre SM-SC. Normally, this has been stored in the memory of the mobile station, in which case it is not necessary to separately input the phone number in connection with the sending of each short message. Thus, when sending a short message, the message goes from the mobile station MS to the base station BTS, and from there, through the base station controller BSC and the mobile services switching centre MSC, further to the short message service centre SM-SC. The short message is stored at the short message service centre SM-SC, wherefrom it will be sent further to the receiving mobile station MS2, in which case the route of the message is the same as in transmission, but in the opposite direction. The short message service centre SM-SC will be informed whether or not the mobile station MS2 has received the short message. Thus, it can re-send the short message, if the mobile station MS2 has not received it for some reason.

In addition, short messages can be sent from a PC. In this case, the mobile services switching centre MSC is in connection with a server GTW (Gateway), which is in connection with the Internet. In this case, the PC that is in connection with the Internet can download from the Internet, for the transmission of the short message, a WWW page (World Wide Web), which can be found, e.g., at the server GTW. On this WWW page, the user inputs the telephone number of the receiving mobile station MS2 and the message to be transmitted, whereupon the message can be sent from the PC, in which case it goes through the Internet and the server GTW to the mobile services switching centre MSC and further to the short message service centre SM-SC, wherefrom the message is further directed to the receiving mobile station MS2 through the mobile communications network.

By means of the short message service SMS of the GSM system, it is possible to send, at a time, a message the maximum length of which is 160 characters. The characters are seven-bit ASCII (American National Standard Code for Information Interchange) characters and, therefore, the maximum length of a message in bits is 1,120 bits, i.e., 140 bytes. Ordinary mobile stations, as the one illustrated in FIG. **3**, have a small display and an advanced keyboard by means of which it is possible to write short messages, i.e., input different types of alpha-numeric characters. The received message is displayed on the display of the mobile station, which enables alpha-numeric characters to be displayed, as illustrated in FIG. **3**.

As is well known, transmissions in the GSM system have been divided into frames. When the length of a message to be transmitted exceeds the permissible maximum length of a frame FR, the message M must be segmented into parts M1–M4, and sent in several frames FR1–FR4, as illustrated in FIG. **4***a*. In reception, the mobile station reconstructs the message M, divided into several frames FR1–FR4, as illustrated in FIG. **4***b*. At a radio interface (FIG. **2**), the maximum length of a frame is normally 168 or 184 bits and, therefore, a short message, the maximum length of which is 1,120 bits, must be segmented into several frames. FIG. **5** illustrates a frame, a so-called LAPDm frame (Link Access Protocol for the Dm channel), to be transmitted at a radio interface, which has normally been divided into three fields. The first field is an address field ADD, which contains the address of the destination of the message (i.e., a receiving mobile station identifier), given in several bytes. In the GSM system, signalling messages are also transmitted within corresponding LAPDm frames. In radio communication, there can simultaneously be two message flows independent of each other: signalling messages and short messages. These two different flows are separated from each other by means of a link identifier, a so-called SAPI (Service Access Point Identifier) to be added to the address field ADD. Its value can be 3, indicating signalling, or 0, indicating a short message. The second field is a control field CTRL, which contains the sending frame and receiving frame numbers

N(S) and N(F). The third field is a data field INFO, containing the actual information, which contains a maximum of 168 bits of information, i.e., the contents of the actual short message.

The transmission of each ringing tone has been identified by means of a specific character code, i.e., an identifier, in which case the receiving mobile station can process the received message directly into a ringing tone, as specified. The identifier has preferably been implemented by using ASCII characters in an information field of the short message transmission frame, i.e., in a field INFO (FIG. 5), which contains the actual short message in characters. The identifier is an identifier agreed on in advance or an identifier formed in some other way, which both the transmitting and receiving device know to signify a ringing tone, e.g. a series of numbers 120 at the beginning of the short message. Because the ringing tone is transmitted in a short message, it can also be received by means of an ordinary mobile station, which does not support this type of ringing tone programming service, but is capable of transmitting and receiving short messages. By placing the ringing tone identifier in the field INFO, there is also the advantage that in an ordinary mobile station, which does not support this type of ringing tone programming service, but is capable of transmitting and receiving short messages, both the ringing tone identifier and the ringing tone in characters are displayed to a user. In addition, by means of this type of ordinary mobile station it is also possible to transmit a message, such as mentioned above, by first writing, on the message, the identifier of the ringing tone in question in characters, and the rest of the information, i.e., the ringing tone in characters, correctly divided. The reception of such a transmission by means of a mobile station, according to the present invention, will produce a fully received ringing tone.

Alternatively, the identifier of a short message containing a ringing tone is formed as a specific bit code in the address or control field of the short message (See FIG. 5). Also in this case, the transmitted ringing tone can be received by an ordinary mobile station in characters, but the ringing tone cannot be stored in a ringing tone memory. In this case, this kind of ringing tone cannot be sent by means of the ordinary mobile station, although a user could input the characters otherwise correctly, unless it is changed so that it, by a specific command, adds said bit code, because otherwise the ordinary mobile station cannot inform the ringing tone identifier.

Instead of a ringing tone identifier being indicated as a character code in a short message (in data field INFO), it can be indicated in an address field ADD of the short message, in which case it is given in bits. A specific byte in the address field of the transmission frame of the short message is a so-called TP-Data-Coding-Scheme, which has been specified in the GSM specification GSM 03.40 and 03.38. The four least significant bits of the byte can be freely used, whereupon they can be used to indicate, according to the present invention, that the short message contains a ringing tone, e.g., by giving said bites b3–b0, wherein b0 is the least significant bit of the byte, a value of 0000 or some other value agreed on.

When the ringing tone is indicated in this way, it does not take the space reserved for the character length of the short message (max. 160 characters).

The ringing tone can be changed into characters and included in the short message as characters in the form of notes in the following way.

Notes in characters:	
C, D, . . . , G, A, H	Notes from A to G of a lower octave
c, d, . . . , g, a, h	Notes from A to G of a higher octave
#	raises the preceding note a semitone (e.g., high)
b	flattens the preceding note a semitone (e.g., dull)
Duration:	
no character	basic length
-	preceding note: half the basic length
+	preceding note: double the basic length
.	preceding note: 1.5 times the basic length
..	preceding note: 1.75 times the basic length
A length character may be cumulative, e.g., a single character always contributes to the effect of the character preceding it. For example, C+ means three times the basic length, C--- means 0.125 of the basic length.	
Rests:	
;	rest; as long as the basic length
,	rest; half the basic length
Other rests can be input by using characters modifying the length of a note together with rest characters.	

As presented above, a ringing tone produced by notes can be coded in characters, which can be sent in a short message, whereupon, in reception, the received characters can be processed into the transmitted ringing tone, which can be stored in a ringing tone memory and reproduced when the phone rings. Thus, the method is particularly suitable for a device, wherein the ringing tone can be programmed as notes through a user interface or it has been pre-stored in a ringing tone memory as notes.

In addition to the specifications presented above, other factors related to a ringing tone and its specification can also be specified as characters, e.g., in the following way:

:ACD :X	,wherein X is an optional number (integral number), repeats a note sequence ACD X times, twice if X is missing
/X ACD /	,wherein X is an optional number (integral number), reduces the length of notes inside characters "/", e.g., by dividing by number X. Third notes, according to this specification, would be marked "/3 ACD /"
$	Inputs sharp and flat notes, e.g., for all notes inside parentheses, in which case it is not necessary to separately input character # or b for these notes.
(:)	Specifies repetitions, e.g., so that (5CD:2E:F) is played CDE CDE CDF CD CD.
!	Switches on/off a "staccato" music mode, e.g., until the following character, increases the length of a note by an appropriate percentage and reduces the proportion of a rest, thus accomplishing a fragmentary style without changing the overall time. In a computer simulation, increasing the length of a note by 50–60% or even by 70% sounds good still.
?	Switches on/off a separate notes function, e.g., until the following character, increases the length of a note for a minimum period of time and a rest lasts for the rest of the time producing music, where two same notes one after another can be heard as separate notes, unlike a "flowing" music mode, wherein preceding notes would be heard as a single note. A rest between notes must have the same duration. Notes that are shorter than the specified rests cannot be heard as separate notes. In a computer simulation, rests between notes that last for about 30 ms sound good by means of the separate notes function.
'	Raises a default octave. If the default octave is 1, raises it to 2, otherwise 1.
"	Lowers a default octave. If the default octave is 3, lowers it to 2, otherwise 3.
	If it is assumed that there are 4 octaves in use, it is possible to

-continued

	use, as presented above, two octaves simultaneously by means of capital and small letters C . . . H, c . . . h.
X	raises all following notes X by one degree, wherein X is an integral number. Flattens, if X is a negative number.
Number (alone)	Specifies a tempo, beats per minute, e.g., how many notes of the basic length per minute.
Empty space to be ignored.	
In addition, a ringing tone can be combined with some other message through a user interface, for example:	
*	a flashing light when the phone is ringing - switches the light on/off.

In the following, the implementation of a mobile station, according to the present invention, and its and operation in transmitting and receiving a ringing tone as a short message will be discussed in more detail by referring to FIG. **6**.

In FIG. **6**, there is a block diagram of the implementation of a mobile station according to the present invention. The mobile station is preferably a mobile station, which has circuits and a user interface that enable a ringing tone to be programmed. A mobile station **1** comprises, for communication using radio communication, a radio unit RU (the reference has not been marked in the figure), which comprises a transmitter branch **2**, known from an ordinary mobile station, (comprising blocks implementing coding, interleaving, ciphering, modulating, and transmitting), a receiving branch **3** (comprising receiving, de-modulating, de-ciphering, de-interleaving, and implementing blocks) and, for transmission using radio communication, a duplex filter **4** that distinguishes between a received and transmitted message, as well as an antenna **5**. The mobile station has a main control circuit **6** that controls its operation. Furthermore, the main control circuit **6** comprises still a RU controller **7** that carries out control functions of an ordinary mobile station. In addition, the mobile station main control circuit **6** comprises blocks **8–12** for sending ringing tones as a short message according to the present invention. Thus, the blocks **8–12** can be said to form a data processing unit DU of the mobile station, which can also be formed in full by programming the main control circuit (processor) **6**. The controls of the radio unit RU and the mobile stations' data processing unit DU do not have to be integrated into the main control circuit but, instead, they could also be implemented apart from each other, so that the RU control circuit **7** is on the radio unit's side, and on the data processing unit's side, there is the DU processor **8**, which is in connection with the RU control circuit **7** for establishing communication between the radio unit and the data processing unit.

In the implementation illustrated in FIG. **6**, a first memory **13** is coupled to the main control circuit **6**. The first memory can be a volatile memory, e.g., RAM, wherein the main control circuit stores in-use data. In addition, the mobile station has a second memory **14**, which is preferably a permanent memory **14**, wherein short messages, ringing tones and other data essential for the functioning of the mobile station, and any other data which a user wants to store permanently, are stored. Alternatively, the short messages can be stored off-line in a memory of an intelligent card, coupled to the mobile station, wherefrom there is a connection to the main control circuit **6**. This type of intelligent card is known, e.g., from the GSM mobile communications system, as a SIM card (Subscriber Identity Module), which usually has storage, e.g., for storing telephone numbers.

The mobile station's user interface comprises a display **15**, and for inputting data, a keyboard or other input device **16**, such as a touch display.

In the case where the data processing unit DU and the radio unit RU are implemented as functionally independent units, both of them should, however, have either common or separate memories **13, 14**, and a user interface UI. Communication between the units would be established by means of a connection between the DU processor **8** and the RU control circuit **7** which, in this connection, is referred to as an external control interface ECI.

In the following, we will discuss the operation of the mobile station, when transmitting ringing tones. By means of the user interface UI, the desired ringing tone is retrieved from the memory, in which case, on the basis of **16** commands from input devices, the control circuit **7** retrieves the ringing tone from the memory **14**. When the user enters, by means of the input devices, a command to send the ringing tone, the DU processor **8** forms, from the ringing tone, a line of characters so that it places at the beginning of the line the ringing tone identifier, e.g., a series of numbers 120 (unless the identifier is given in the address field), then transforms the ringing tone into characters, e.g., to ASCII characters as presented above, and places the characters after the identifier. As presented above, a short message is sent by air in bits or as binary characters in frames. The DU processor **8** transforms the ASCII characters into binary characters. One way of implementing this transformation will be discussed later. Hence, the DU processor **8** comprises, for the processing of the characters, character transformation functions, which have been implemented programmably and stored in the memory **14**, wherefrom the DU processor **8** retrieves the program and performs the functions according to the program. The DU processor **8** transfers the line of characters formed to a SMS transmission controller **10**, which adds to the message address information, i.e., the information on the destination on the basis of the user input information. Thus, this type of SMS transmission controller is a kind of bit and/or character generator. The transformation of the ringing tone into characters is preferably implemented as an application program, stored in the memory **14**, which is used by means of the DU processor **8**.

When the address information has been added at the SMS transmission controller **10**, the message is transferred into an outbox **11**, which tries to send the message, and which has a buffer, wherein the message is stored in case the transmission fails. If the transmission fails, the outbox **11** retries to send the message. When the DU controller **8** notices that the radio unit RU is ready to send the message, the message is transferred to a message transfer running circuit **12**, which adds to the message information relating to the mobile communications system in question, such as validity information (which indicates in which direction the message is going, i.e., from a mobile station to a message service centre or vice versa), processes the address information into a form required by the mobile communications system, and adds to the message the address of the message service centre, as well as the short message identifier (SAPI), and forms from the information to be transmitted, e.g., a digital signal for a transmitter **2**, and sends the message to the radio transmitter branch **2** of the radio unit RU. In the case where the ringing tone identifier is placed in bits in the address field ADD, the running circuit **12** adds to the message the identifier in question. The transmitter branch **2** codes the signal according to the specifications of the mobile communications system, and forms, on the basis of the signal it receives from the running circuit **12**, the frames to be transmitted, which the transmitter sends using radio communication to the short message service centre SM-SC, wherefrom they are sent further to the receiver (see FIG. **1**). In the transmitter branch

2, the message is processed according to the mobile communications system, e.g., coding, interleaving, ciphering, burst forming, modulating, and transmission.

Operations according to blocks **8**, **10–12** could also be carried out by means of a PC, which has a connection to a short message service centre, e.g., through the Internet. The operations **8**, **10–12** could be carried out programmably by means of a computer processor, and different kinds of ringing tones can be stored in the computer's memory. In this case, it can be assumed that the block **12** is coupled to the computer outport or modem, wherefrom the Internet can be contacted and, thus, the message can be sent to the short message service centre, which transmits the short message to a receiving mobile station, as presented in FIG. **2**.

In the following, we will discus the operation of the mobile station in receiving a ringing tone as a short message. When a communicator receives a ringing tone as a short message, the message first arrives at the radio unit RU. There, at a receiving branch **3**, the processing of the message takes place according to the mobile communications system, such as reception, demodulating, de-ciphering, de-interleaving, and decoding. If the received frame identifier (SAPI) indicates that the message is a short message, it will be transferred into a destination box **9** of the data processing unit, which can be a memory for storing the message. The received short message can be stored in a memory located in the SIM card or in the mobile station's permanent memory **14**. If the received message is an ordinary short message, the DU processor **8** will report the short message received. If the message has an identifier, which indicates that it is a ringing tone, the DU processor **8** will perform a transformation of the binary characters into ASCII characters and further the transformation of the ASCII characters into a ringing tone and store the ringing tone in the permanent memory **14**. A person skilled in the art will understand that alternatively, the user my first be asked whether to accept or reject, i.e. whether to store in the permanent memory or not, the received ringing tone. In addition, error checking can be added to the transformation so that the DU processor checks whether the received sequence has any errors. If there are no errors, the ringing tone sequence is stored in the ringing tone memory **14** as a ringing tone, in which case the reception of the short message will be displayed to a user as a received ringing tone. If there were errors, the ringing tone sequence is not stored in the ringing tone memory, but only in the short message memory **14** as an ordinary short message. When the ringing tone has been successfully received, the DU processor **8** can launch the application for programming the ringing tone and displaying the ringing tone on the display as notes and to present the ringing tone as notes on the display **15** (if the mobile station has such an application).

In the following, we will discuss one way of transforming ASCII characters into binary characters. The ASCII characters can be presented as hexadecimals, which can be easily further transformed into binary numbers. In the following, we will present how the word "Calling" is transformed into a binary number. In the following, two numbers, in a hexadecimal form, correspond to the ASCII character, separated by a space, and each of the hexadecimal characters can be presented in four bits, i.e., in the following, each ASCII character is presented by means of 8 bits.

As ASCII characters: Calling

In the hexadecimal form: 43 61 6C 6C 69 6E 67

In the binary form: 0100 0011 0110 0001 0110 1100 0110 1100 0110 1001 0110 1110 0110 0111

In the actual transmission, the characters are sent one after another without spaces, i.e., as an unbroken bit sequence. Thus, for each ASCII character, there is a specific hexadecimal and binary form, in which case the examples presented above for specifying notes by means of ASCII characters can be transformed into binary characters.

When the note specifications have been transformed into a ringing tone message in a binary form, it can easily be sent in an infrared signal by means of an infrared link or in USSD, wherein it can also be sent as characters as in SMS. As is well known, it is possible to implement, in a mobile station, an infrared link for transmitting and receiving an infrared signal. Thus, in addition to radio parts **2–5**, a mobile station, as illustrated in FIG. **6**, could have an infrared transmitter and receiver similarly connected to a main control circuit **6**. For sending a ringing tone in the USSD, the necessary modifications can be implemented in transmission and reception blocks **2** and **3**.

Another alternative for sending a ringing tone as characters is to first convert it into a MIDI form (Musical Instrument Data Interface), which is a well known communications language for instruments. This could be implemented by arranging, in a mobile station, a MIDI converter. The MIDI converter would preferably be located in the DU processor **8** which, in this case, in reception, would convert the characters, received in MIDI, into an appropriate form for the telephone's ringing tone generator and memory. Similarly, in transmission, the MIDI converter would convert the ringing tone into characters in accordance with the MIDI form. The MIDI converter would enable ringing tones to be composed, e.g., by means of computer-based composition programs supporting the MIDI form and, thus, the transmission of the produced melody from a computer to a mobile station, e.g., in a short message.

In the following, we will discuss, as an example, one way of implementing the application presented above for programming a ringing tone by means of a user interface, i.e., a way of programming ringing tones in a telephone as notes by referring to FIG. *7b*.

In this exemplary implementation, a stave is produced on the display **15** of the mobile station, whereon, by means of a menu and keys **30***a* and **30***b*, displayed on the display, desired notes can be selected and placed in the desired place on the stave, displayed on the display, by means of a cursor moved by keys. The display illustrated in FIG. *7b* can be implemented in a mobile station with a larger display or, equally, a graphic stave can be implemented on a display of the size of an ordinary mobile station, e.g., on a matrix-type liquid crystal display.

In this exemplary implementation, from the menu to be displayed on the display through keys, the desired clef can be selected and, always at the place indicated by the cursor, a note can be placed, the duration and pitch of which (i.e., the position on the stave) can be changed by means of the keys **30***a* and **30***b*, and the menu. For example, to modify the duration of a note, a duration menu is accessed through the keys **30***b*, wherein, through the browse key **30***a*, an eighth note, a quarter note, a half note or a whole note or, correspondingly, an eighth rest, a quarter rest, a half rest or a whole rest can be selected on the stave. These notes have been illustrated in FIG. *7a*. Similarly, to modify the pitch of a note (the position of the note on the stave in the vertical direction), the position of the note on the stave can be raised by pressing the browse key **30***a* in one direction (the key pointing upwards), and the position of the note on the stave can be lowered by pressing the browse key **30***a* in the other direction (the key pointing downwards). In this way, it is

possible to produce any desired note, e.g., rest, c, d, e, f, g, a, h, c^1, d^1, e^1, f^1, g^1, a^1, h^1, c^2, d^2, e^2, f^2, g^2, a^2, or h^2. Sharp (cis, dis, eis, fis, gis, ais, his, cis^1, dis^1, . . . , cis^2, dis^2, . . . , his^2) and flat (ces, des, es, fes, ges, as, b, ces^1, des^1, . . . , ces^2, des^2, . . . , b^2) notes can also be produced through the browse key **30***a*, in which case on the display, in front of the note, a symbol indicating either a sharp or flat note is produced, which have also been illustrated in FIG. **7***a*. In this way, it is possible to produce, on the stave, the desired notes and rests one after another, e.g., so that the melody has a maximum of 60 successive notes. An example of a display of a mobile station, when it is in a melody-producing mode, has been illustrated in FIG. **7***b*, which shows a stave, a clef, different notes, as well as a cursor (arrow), which indicates the place of the note, the length (duration) and pitch of which can be changed, in the same way as when selecting a note as presented above. On the stave, illustrated in FIG. **7***b*, the third note and the fourth note from the left are examples of sharp (raised) notes.

As an alternative to producing tones on a stave by means of keys and a menu, the notes could be displayed as icons on the display, wherefrom they could be dragged and released (i.e., placed) in the desired place on the stave by means of a pointer moved by a so-called spin wheel or track ball. The use of the spin wheel or track ball could be avoided by using a touch display, in which case the icons in question could be placed on the stave by means of a finger or a pen.

In addition, by means of the user interface, a tempo could be set, e.g., beats per minute bpm, at which tempo the produced ringing tone (the melody written on the stave) is reproduced. In this case, the length of a fourth note in milliseconds is t=1000x(60/temp), in which case, if the tempo is 150 bpm, the length of the fourth note is 400 ms or 0.4 seconds. The tempo can be set in numbers, e.g., between 50 . . . 999 bpm. The tempo is preferably set by selecting, from the menu, a tempo command in which case the desired tempo can be input onto the display through keys.

As an alternative, the notes could be displayed on the display as letter symbols and/or programmed through an ordinary keyboard of a telephone comprising twelve keys (keys 0–9, * and #). In this case, each tone (a note or a rest) can be produced through a specific key or as a combination of two keys. In this case, the pressing of one or two keys corresponds to a specific tone, the corresponding note of which can be displayed on the mobile station's display as a response to the pressing of the key (either as a letter symbol or as a note on a stave), as presented above, or the tone can be reproduced, as a response to the pressing of the key, through a speaker of the mobile station, in which case a user can hear it. The duration of the pressing of the key or, in the case where two successive presses are executed, e.g., the duration of the latter press is proportional to the length of the tone. In addition, the programming of a ringing tone could be implemented by inputting, through a user interface, characters, e.g., in a similar way as presented above for transforming the ringing tone for a short message.

In the following, we will discuss how to produce a ringing tone in a telephone by referring to FIG. **6**. A central unit **6** receives in a short message (or from a user interface UI, which comprises a keyboard **16** and/or a display **15**, according to the methods presented above) tones (notes) selected by a user are received and stored in a memory **14** as a whole melody. When a call is coming in, according to the specifications of mobile communications systems, a message from a base station arrives first at the mobile station. This message is received from an antenna **5** to a receiver **3** of the mobile station, wherefrom the message arrives at the central unit **6**. As a response to this, the central unit **6** gives a sound generator **17** a control signal **19**. On the basis of the control signal, the sound generator **17** generates the ringing tone, which is a sequence of sounds with a specific frequency based on the melody specified by the notes. The central unit **6** produces the control signal by reading, from the memory **14**, the ringing tone stored therein. Thus, the control signal **19** contains the information for the sound generator **17** specifying what kind of ringing tone it should produce for a ringing tone reproduction device **20**, which can be a buzzer, a speaker or some other transformer that transforms the electric signal into sound. When a user answers the phone by pressing an answering key, the user interface UI gives a signal to the central unit **6** which, as a response to the pressing of the key, stops giving the sound generator the ringing tone control signal **19**, whereupon the ringing tone stops.

As a sound generator **17**, it is possible to use, e.g., a commercially available Codec ST5090 circuit, manufactured by SGS-Thomson, which includes a sound generator, which is capable of producing sounds between 15.6 Hz . . . 3,984 Hz at 15.6 Hz intervals, i.e., 256 sounds each having a different frequency. The sound frequency is produced on the basis of an 8-bit signal, which indicates a number between 0–256, in which case number 1 of the control signal corresponds to step 1 of the sound generator, i.e., to a frequency of 15.6 Hz and, correspondingly, number 2 corresponds to a frequency of 31.2 Hz, etc. The tones presented above can thus be reproduced as sounds, e.g., according to the following frequencies (not necessarily exact values, order of magnitude given) and by means of the following control signals (bytes), brought to the sound generator, of which some have been presented below and the rest can be concluded by persons skilled in the art according to the principle presented above:

a=880 Hz corresponding to step **56** of the sound generator, i.e., control byte '00111000' (more accurately, 56x15.6 Hz=873.6 Hz), ais=932 Hz, b=988 Hz corresponding to the sound generator's step **63** or control byte '00111111' (more accurately, 63x15.6 Hz=982.8 Hz), c^1=1,047 Hz, cis^1=1,109 Hz, d^1=1,175 Hz, dis^1=1,245 Hz, e^1=1,319 Hz, f^1=1,397 Hz, fis^1=1,480 Hz, g^1=1,568 Hz, a^1=1,760 Hz, ais^1=1,865 Hz, h^1=1,976 Hz, c^2=2,093 Hz, cis^2=2,217 Hz, d^2=2,349 Hz, dis^2=2,489 Hz, e^2=2,637 Hz, f^2=2,793 Hz, fis^2=2,960 Hz, g^2=3,136 Hz, gis^2=3,322 Hz and a^2=3,520 Hz corresponding to the sound generator's step **226** or control byte '11100010' (more accurately, 226x15.6 Hz=3,525.6 Hz).

The frequencies corresponding to tones c-a^2 and to their raised and flattened tones, have preferably been pre-defined in the mobile station (or, at least, the tones necessary for producing the ringing tone), e.g., stored in the memory **14**. One byte is stored in the memory **14** for each tone or sound to be produced, in which case, if the melody is formed of 60 tones, 60 bytes will be stored in the memory. The central unit **6** retrieves these bytes from the memory **14** (**12**) and controls the sound generator **17** to produce the melody as the ringing tone. Said known codec circuit also has a clock entry and an internal clock signal generator which, in FIG. **6**, has been illustrated as an off-line clock generator **18**, which controls the operation of the sound generator **17** according to a specific clock tempo. This clock tempo can be fixed, so that the tempo of the sound generator is set to, e.g., 150 bpm. The tempo can be specified in a short message or changed through the user interface. The set tempo is stored in the memory **14**, and the sound generator **17** is controlled to generate sound at the set tempo on the basis of a signal it receives from the clock generator **18**.

The central unit **6** identifies characters (or characters produced through the user interface UI) or pressing of keys and processes them to a frequency corresponding to the character or press of the key in question, and stores, in the memory **14**, the signal corresponding to the frequency in question, which is taken to the sound generator **17**, when the ringing tone is reproduced.

Another method for producing a control signal for the sound reproduction device **20** is to use, as the sound generator, a counter, e.g., a 16-bit counter, so that it counts downwards from 65,535 to 0. When a sound is produced, the counter is released to count downwards from a pre-set figure. When the counter reaches 0, a pulse is produced, and the counter re-begins to count downwards from a pre-set figure. A sound is formed of a number of pulses. The counter counts from 65,535 to 0 in 1/18 seconds, in which case, a pulse wave corresponding to 18 Hz is produced. If, in this case, 4,096 is given to the counter as the pre-set figure (in which case, it counts from 4,096 to 0), a pulse wave having a frequency of (65,535/4,096)×18=288 Hz is produced. In this way, pulse waves with different frequencies between 18 Hz–1.18 MHz can be produced. Pulse waves, produced in this way, can be used as a pulse-width modulation to be input into a sound reproduction device, such as a buzzer, which vibrates according to the pulse wave.

As is well known, a user may select, from current telephones, through a user interface, the ringing tone, stored in a ringing tone memory, he/she wants to be reproduced when the telephone rings.

The present invention enables new ringing tones to be obtained for a telephone quickly and in a simple way. It is not necessary for a user to program a ringing tone through a user interface or to take the telephone to a service outlet where a ringing tone would be loaded electronically. Neither is it necessary to prepare a ringing tone memory of the telephone, but ringing tones can be received directly by means of wireless communication. Similarly, the user can him/herself send ringing tones to a second mobile station. In addition, ringing tones can be transmitted to a mobile station, in a short message, from a computer which is in connection with a short message service centre, e.g., through the Internet.

This paper presents the implementation and embodiments of the present invention with the help of examples. It is obvious to a person skilled in the art that the present invention is not restricted to details of the embodiments presented above, and that the invention can also be implemented in another form without deviating from the characteristics of the invention. The embodiments presented should be considered illustrative, but not restricting. Thus, the possibilities of implementing and using the invention are only restricted by the enclosed patent claims. Consequently, the various options of implementing the invention as determined by the claims, including the equivalent implementations, also belong to the scope of the invention.

What is claimed is:

1. A mobile communications system, having a mobile communications network and at least one mobile station for wireless communication, the system comprising:

means for transmitting and receiving speech,

a memory for storing a ringing tone,

means for reproducing the ringing tone as a signal of an incoming call,

means for modifying the ringing tone, stored in the memory, into characters, and

means for transmitting said characters with a ringing tone identifier identifying the transmission as a ringing tone transmission.

2. A mobile communications system, having a mobile communications network and at least one mobile station for wireless communication, the system comprising:

means for transmitting and receiving speech,

a ringing tone memory for storing a ringing tone,

means for reproducing the ringing tone as a signal of an incoming call,

means for receiving messages with characters,

means for detecting a ringing tone identifier in a received message informing the message is a ringing tone,

means for receiving a ringing tone as characters through wireless communication, and

means for modifying said characters into a form for being stored in the ringing tone memory.

3. A mobile station for wireless communication, comprising:

means for transmitting and receiving speech,

a ringing tone memory for storing a ringing tone,

means for reproducing the ringing tone as a signal of an incoming call,

means for modifying the ringing tone, stored in the memory, into characters, and

means for transmitting said characters with a ringing tone identifier identifying the transmission as a ringing tone transmission.

4. A mobile station for wireless communication, comprising:

means for transmitting and receiving speech,

a ringing tone memory for storing a ringing tone,

means for reproducing the ringing tone as a signal of an incoming call,

means for receiving messages with characters,

means for detecting a ringing tone identifier in a received message informing the message is a ringing tone,

means for receiving a ringing tone as characters through wireless communication, and

means for modifying said characters into a form for being stored in the ringing tone memory.

5. A method for programming a ringing tone of a telephone, comprising the steps of:

storing a ringing tone in a memory,

reproducing said ringing tone by means of sound reproduction means as a response to an incoming call to the telephone, and

modifying said ringing tone into characters and transmitting it to the telephone by wireless communication as characters with a ringing tone identifier identifying the transmission as a ringing tone transmission.

6. A method according to claim **5**, wherein a ringing tone is sent to the telephone as characters containing specifications of notes.

7. A method according to claim **5**, wherein, in the telephone, upon receiving a message and detecting a ringing tone identifier in the message received as characters, the characters are modified into such a form that they can be stored in a memory.

8. A method according to claim **5**, wherein the characters are sent in a short message.

9. A terminal for data transmission, comprising:

a ringing tone memory **(14)** for storing a ringing tone,

means for transforming the ringing tone into characters, and

means for transmitting said characters with a ringing tone identifier identifying the transmission as a ringing tone transmission.

10. A terminal according to claim **9**, further comprising:

means for establishing a connection to a short message service center of a mobile communications system, and

means for transmitting said characters in a short message through the short message service center.

* * * * *

US 20010024965A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2001/0024965 A1**

Hayashi (43) **Pub. Date: Sep. 27, 2001**

(54) **MOBILE COMMUNICATION TERMINAL AND RINGING METHOD THEREOF**

(76) Inventor: **Keiichi Hayashi**, Kanagawa (JP)

Correspondence Address:
SUGHRUE, MION, ZINN
MACPEAK & SEAS
2100 Pennsylvania Avenue, N.W.
Washington, DC 20037 (US)

(21) Appl. No.: **09/759,220**

(22) Filed: **Jan. 16, 2001**

(30) **Foreign Application Priority Data**

Jan. 21, 2000 (JP) 017751/2000

Publication Classification

(51) **Int. Cl.**[7] **H04M 1/00**

(52) **U.S. Cl.** **455/567**; 455/557

(57) **ABSTRACT**

A mobile communication terminal and its ringing method are provided for sounding an incoming ring tone and a tone for notifying reception of an e-mail in various tones. A portable telephone serving as the mobile communication terminal includes an operating part, a timer, a memory, a display, a display controller, an interface, a tone generator, a speaker and a controller. The tone generator changes settings of ringing tones based on tone information contained in melody data fetched from a server equipment and stored in the memory. It is therefore possible to play melodies in accordance with desired incoming ring tone patterns in various tones, based on user settings entered from the operating part.

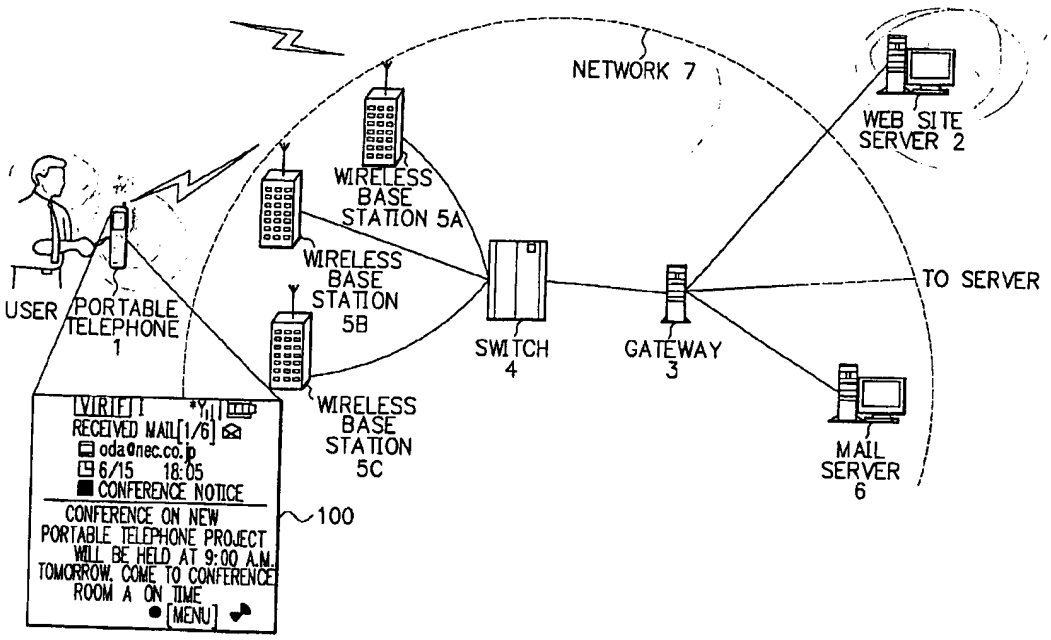


FIG. 1

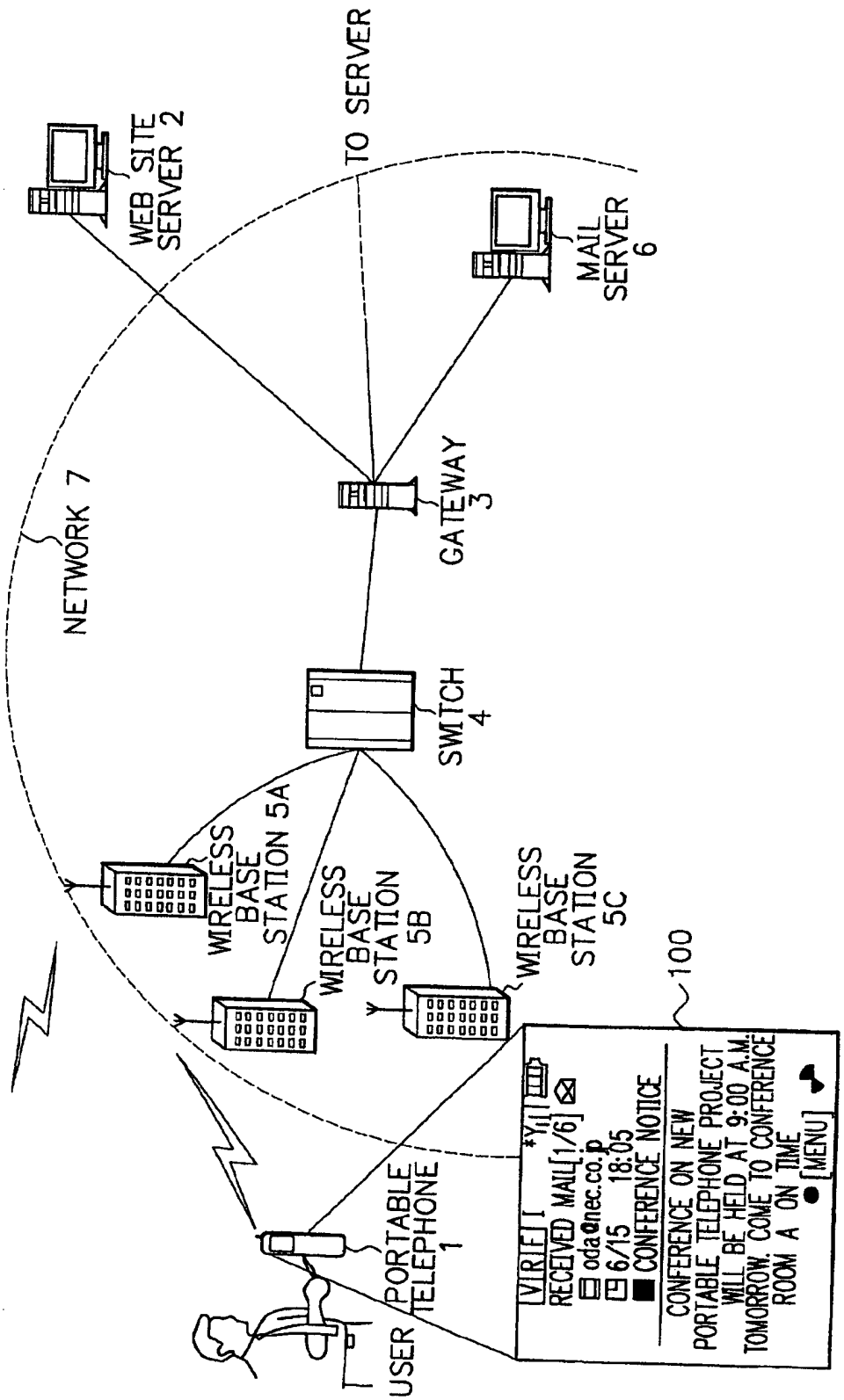

TO SERVER
WEB SITE SERVER 2
MAIL SERVER 6
NETWORK 7
GATEWAY 3
SWITCH 4
WIRELESS BASE STATION 5A
WIRELESS BASE STATION 5B
WIRELESS BASE STATION 5C
100
PORTABLE TELEPHONE 1
USER
VIRIE[ ]
RECEIVED MAIL[1/6]
oda@nec.co.jp
6/15 18:05
CONFERENCE NOTICE
CONFERENCE ON NEW PORTABLE TELEPHONE PROJECT WILL BE HELD AT 9:00 A.M. TOMORROW. COME TO CONFERENCE ROOM A ON TIME
[MENU]

FIG. 2

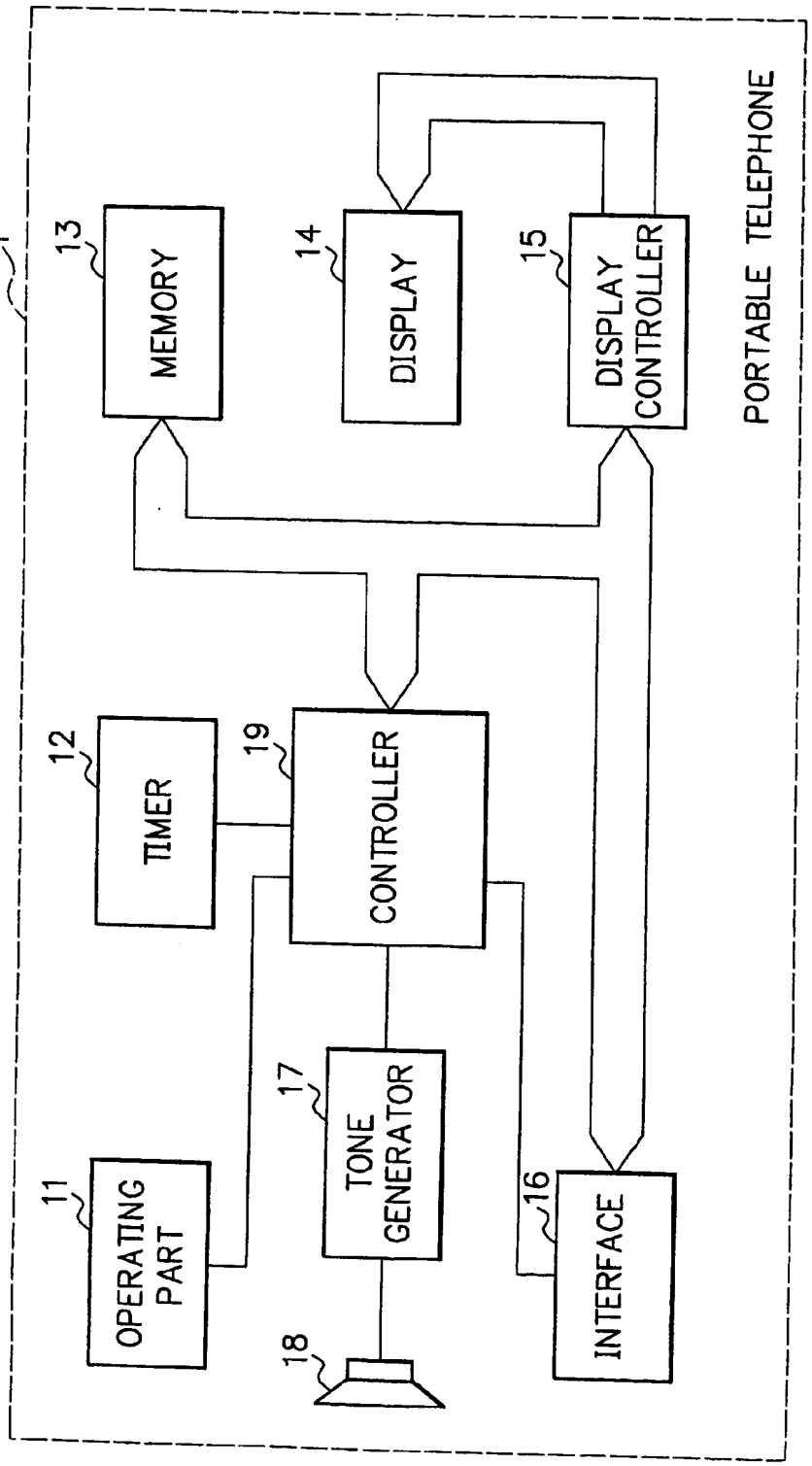
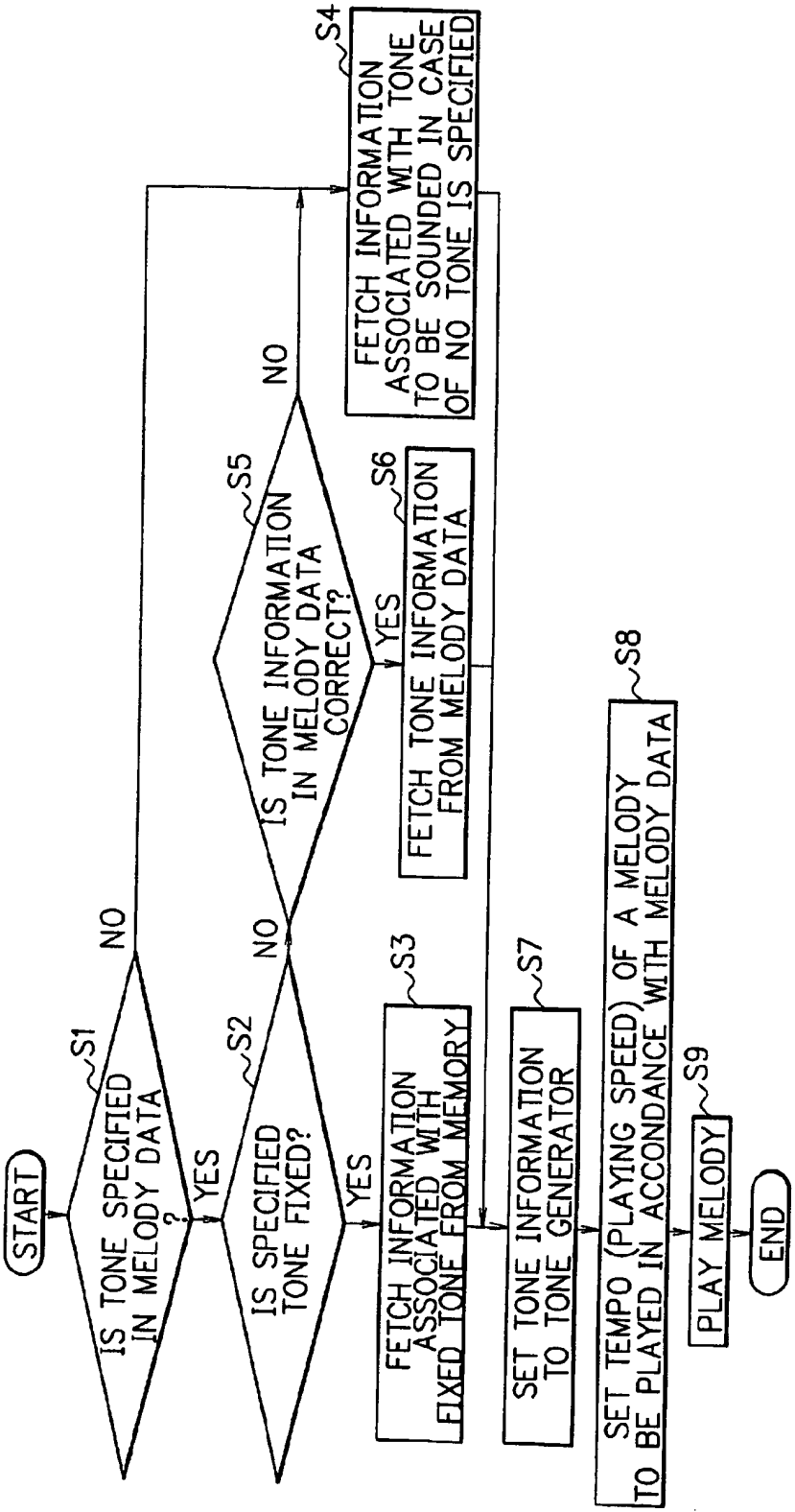

1
PORTABLE TELEPHONE
13
MEMORY
14
DISPLAY
15
DISPLAY CONTROLLER
12
TIMER
19
CONTROLLER
17
TONE GENERATOR
11
OPERATING PART
16
INTERFACE
18

FIG. 3


START
S1
IS TONE SPECIFIED IN MELODY DATA ?
NO
YES
S2
IS SPECIFIED TONE FIXED?
NO
YES
S3
FETCH INFORMATION ASSOCIATED WITH FIXED TONE FROM MEMORY
S4
FETCH INFORMATION ASSOCIATED WITH TONE TO BE SOUNDED IN CASE OF NO TONE IS SPECIFIED
S5
IS TONE INFORMATION IN MELODY DATA CORRECT?
NO
YES
S6
FETCH TONE INFORMATION FROM MELODY DATA
S7
SET TONE INFORMATION TO TONE GENERATOR
S8
SET TEMPO (PLAYING SPEED) OF A MELODY TO BE PLAYED IN ACCONDANCE WITH MELODY DATA
S9
PLAY MELODY
END

MOBILE COMMUNICATION TERMINAL AND RINGING METHOD THEREOF

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a mobile communication terminal and its ringing method. More particularly, the invention relates to a mobile communication terminal and its ringing method provided with the capabilities to change settings of an incoming ring tone and other tones.

Description of the Related Art

[0002] In a conventional portable telephones serving as mobile communication terminals, ring tone patterns stored in the internal memory are changed based on the information entered by a user by using control keys. These telephones then sound a tone associated with these patterns when there is an incoming call or an e-mail is received by means of a mail function.

[0003] In addition to the ring tone patterns stored in advance in the internal memory and desired ring tone patterns entered (created or edited) by the user, some portable telephones are recently known which download new ring tone patterns as melody data from a server equipment by using a browser function and store the patterns in the memory to set an incoming ring tone and a tone for notifying an incoming e-mail.

[0004] However, the conventional mobile communication terminals described above simply play a melody according to ring tone patterns stored in a memory in a fixed tone (that is, an electronic sound), thus resulting in a simple and monotonous melody which lacks expressive power.

[0005] Although the conventional terminals have the capability to change tone settings, there is a cumbersome task of keeping tone-related data in the memory and changing the data for each musical piece. Besides, the number of tones that can be expressed is limited by memory capacity.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a mobile communication terminal and its ringing method capable of setting downloaded tone information as an incoming ring tone and a tone for notifying reception of an e-mail without being limited by memory capacity.

[0007] Another object of the present invention is to provide a mobile communication terminal and its ringing method capable of setting a variety of tones.

[0008] To solve the above described problem, the present invention as set forth in claim 1 is a mobile communication terminal equipped with a browser function comprises means for fetching melody data from a server apparatus by using said browser function; and tone setting means for setting ringing tones based on tone information contained in said melody data.

[0009] The invention as set forth in claim **2**, is characterized in that in the invention as set forth in claim **1**, if said melody data contains no tone information, said tone setting means sets a ringing tone based on preset tone information.

[0010] The invention as set forth in claim **3**, is characterized in that in the invention as set forth in claim **1**, if said melody data contains tone information, said tone setting means judges the validity of said tone information.

[0011] The invention as set forth in claim **4**, is characterized in that in the invention as set forth in claim **3**, said tone setting means sets ringing tones by performing a modulation processing based on said tone information contained in said melody data.

[0012] The invention as set forth in claim **5**, is characterized in that in the invention as set forth in claim **4**, said tone information contained in said melody data constitutes tone parameters used for said modulation processing.

[0013] The invention as set forth in claim **6**, is characterized in that in the invention as set forth in claim **2**, further comprises ringing-speed setting means for setting a tempo at which a melody is played in accordance with said melody data.

[0014] The invention as set forth in claim **7**, is characterized in that in the invention as set forth in claim **5**, further comprises ringing-speed setting means for setting a tempo at which a melody is played in accordance with said melody data.

[0015] A ringing method for a mobile communication terminal equipped with a browser function, in accordance with the invention as set forth in claim **8**, comprises the steps of: having access to a server equipment by means of said browser function; notifying said server equipment of desired melody data in conformity with said access; receiving said desired melody data from said server equipment; storing said desired melody data received in said receiving step; judging whether said melody data stored in said storing step contains tone information; fetching said tone information if said judging step judges that said melody data contains the tone information; setting a tone for playing a melody in accordance with said melody data, based on said tone information fetched in said fetching step; and playing said melody in said tone set in said setting step.

[0016] The invention as set forth in claim **9**, is characterized in that in the invention as set forth in claim **8**, if said melody data contains no tone information, said tone setting step sets a ringing tone based on preset tone information.

[0017] The invention as set forth in claim **10**, is characterized in that in the invention as set forth in claim **8**, if said melody data contains tone information, said tone setting step judges the validity of said tone information.

[0018] The invention as set forth in claim **11**, is characterized in that in the invention as set forth in claim **10**, said tone setting step sets ringing tones by performing a modulation processing based on said tone information contained in said melody data.

[0019] The invention as set forth in claim **12**, is characterized in that in the invention as set forth in claim **11**, said tone information contained in said melody data constitutes tone parameters used for said modulation processing.

[0020] The invention as set forth in claim **13**, is characterized in that in the invention as set forth in claim **9**, further comprises a ringing-speed setting step of setting a tempo at which a melody is played in accordance with said melody data.

[0021] The invention as set forth in claim 14, is characterized in that in the invention as set forth in claim 12, further comprises a ringing-speed setting step of setting a tempo at which a melody is played in accordance with said melody data.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The objects and features of the present invention will become more apparent from the consideration of the following detailed description taken in conjunction with the accompanying drawings, in which:

[0023] FIG. 1 is a conceptual diagram showing a melody-data delivery system according to an embodiment of the present invention;

[0024] FIG. 2 is a block diagram showing a schematic configuration of a mobile communication terminal according to the embodiment of the present invention; and

[0025] FIG. 3 is a flowchart showing an example of operations with respect to setting tones and sounding an incoming ring tone on the mobile communication terminal according to the embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] A mobile communication terminal and its ringing method according to an embodiment of the present invention will now be described in detail with reference to the accompanying drawings. FIGS. 1 to 3 show the embodiment of the mobile communication terminal and a method of sounding an incoming ring tone on the terminal according to the present invention.

[0027] FIG. 1 is a conceptual diagram showing a melody-data (ringing tone patterns) delivery system for the mobile communication terminal according to the embodiment of the present invention. As shown in FIG. 1, the melody-data delivery system according to the present embodiment forms a network 7 comprising a portable telephone 1 owned by a user, which serves as a mobile communication terminal, a Web-site server 2 for managing the melody data to be delivered, a gateway 3, a switch 4, wireless base stations 5A to 5C and a mail server 6.

[0028] In the system, when the user initially starts communications with the wireless base station 5B for requiring to obtain melody data, by using a browser function equipped in his/her portable telephone 1, the base station 5B completes access to the Web site server 2 through the gateway 3 and switch 4.

[0029] The Web site server 2 then delivers the melody data requested by the user to the portable telephone 1 through the gateway 3, the switch 4 and the wireless base station 5B.

[0030] The mail server 6 is a server equipment which manages e-mails sent to the address set for the portable telephone 1 as well as e-mails sent by the use of the portable telephone 1.

[0031] The melody data (incoming ring tone patterns) thus delivered is stored in a memory 13 (which will be described below) of the portable telephone 1 and the data is used for sounding an incoming ring tone based on user settings when there is an incoming call or an e-mail is received.

[0032] FIG. 2 is a block diagram showing a schematic configuration of the mobile communication terminal according to the present embodiment. In FIG. 2, the portable telephone 1 serving as the mobile communication terminal according to the present embodiment, is configured by an operating part 11, a timer 12, a memory 13, a display 14, a display controller 15, an interface 16, a tone generator 17, a speaker 18 and a controller 19.

[0033] The operating part 11 comprises a plurality of control keys (not shown) for use by the user to enter telephone numbers, e-mail addresses, e-mail documents composed of characters, symbols, numerals, etc., various functional assignments or the like.

[0034] The timer 12 is provided with a clock function to the portable telephone 1 and is used to set alarms and count elapsed time of a call or the like.

[0035] The memory 13 as described above, stores incoming ring tone patterns delivered by the Web server or the like, incoming ring tone patterns created and edited by the user, information on the telephone numbers and e-mail addresses registered by the user and other information related to memos, as well as a control program for various operation settings.

[0036] The display 14 visually displays information about the various settings made by the user via the operating part 11, the telephone numbers entered, character information during preparation of an e-mail, information about received e-mails and the like. The use of a TFT-LCD (thin film transistor-color liquid crystal display) will increase the visibility of a screen on the display 14.

[0037] One example of a received e-mail displayed on the display 14 is partly shown in FIG. 1 with a reference numeral 100.

[0038] The display controller 15 controls the display 14 to change over contents displayed on the display 14 in synchronization with timings of inputs from the operating part 11. The display controller 15 changes over display timings, it also performs adjustment controls, such as adjustment of display densities and, if a color liquid crystal display is used as described above, adjustment of grays of color or the like.

[0039] Peripheral devices, for example, a personal computer and an external keyboard can be connected to the interface 16, thereby enabling to send e-mails and to connect to the Internet, by using communications functions of the portable telephone 1.

[0040] With a help of the controller 19, the tone generator 17 fetches tone data (tone information) specified in the melody data, that is, incoming ring tone patterns, which has been delivered from the Web server 2 and stored in the memory 13. The tone generator 17 then sets the actual playing speed (tempo) of a melody or tune to be played through the speaker 18 conforming to the melody data, which indicates the setting of a tone associated with the melody data.

[0041] The tone generator 17 produces various tones such as tones of various musical instruments by performing a modulation processing based on tone parameters in the melody data stored in the memory 13.

[0042] The controller 19 controls operations of the parts described above based on the control program stored in the

memory **13**. The controller **19** also executes controls of various operations based on the user settings entered from the operating part **11**.

[0043] **FIG. 3** is a flowchart showing an example of operations such as a tone setting and a ringing operation on the mobile communication terminal according to the embodiment of the present invention. In step S1 of **FIG. 3**, when the mobile communication terminal receives a call or e-mail, the controller **19** of the terminal checks as to whether melody data stored in the memory has tone specifications (tone parameters).

[0044] If the melody data has the tone specification (YES in Step S1), it is checked in step S2 whether the specified tone is a fixed tone. If YES is rendered in step S2, that is, in a case where the specified tone is a fixed tone, information or data corresponding to the fixed tone is fetched from the memory (Step S3), then the processing goes to Step S7.

[0045] If it is determined in step S1 that the melody data has no tone specifications, the controller **19** fetches from the memory information or data corresponding to a tone which will be sounded when there is no tone specification (step S4). The controller **19** then advances processing to step S7.

[0046] If it is determined in step S2 that the specified tone is not a fixed tone, a check is made in step S5 as to whether the tone information contained in the melody data is correct. If it is correct (YES in step S5), the controller **19** fetches the tone information in the melody data (step S6). The processing then goes to step S7.

[0047] Alternatively, if a determination is made in step S5 that the tone information in the melody data is not correct, the processing goes to step S4 where the controller **19** fetches from the memory information or data corresponding to a tone to be sounded when there is no tone specification. The processing then goes to step S7.

[0048] In step S7, the tone information which has been fetched in step S3, S4 or S6 is set to the tone generator **17**. Tempo (a playing speed in other words) of a melody to be played in association with the melody data is also set in step S8. After these settings, the melody is played in step S9.

[0049] The embodiment described above is a preferred embodiment of the present invention. Various modifications may be made without departing from the spirit of the present invention. Other possible embodiments of the present invention will be described below.

[0050] The present invention can be applied to, for example, a portable e-mail terminal or the like which can download melody data from a server equipment and set the downloaded data as data corresponding to a ringing tone which will be sounded when the terminal receives an e-mail. In such terminal, tone information is specified when the terminal sounds the ringing tone in accordance with a melody, upon reception of an e-mail or when the terminal plays a music at a time when an e-mail is opened, in accordance with melody data attached to the e-mail. Thereby, it is possible to play melodies in a rich tone when an e-mail is received or opened.

[0051] It is also possible to play various melodies in rich tones without keeping tone information in the mobile communication terminal, because the tones are specified directly together with data to be used for ringing a tone.

[0052] As apparent from the above description, the mobile communication terminal and its ringing method according to the present invention enable to sound an incoming ring tone in various tones when there is an incoming call or an e-mail arrives, which results in making it possible to play melodies expressively.

[0053] The mobile communication terminal and its ringing method according to the present invention dynamically change the tone of melodies to be played when a call is received. Such operation reduces the amount of memory taken up by the tone information.

[0054] Furthermore, the mobile communication terminal and its ringing method according to the present invention change the tone dynamically, therefore it is possible to eliminate inconvenience of setting the tone anew for each musical piece while allowing the tone to be set for each phrase or each scale when a single musical piece is played.

What is claimed is:

1. A mobile communication terminal equipped with a browser function, comprising:

means for fetching melody data from a server apparatus by using said browser function; and

tone setting means for setting ringing tones based on tone information contained in said melody data.

2. The mobile communication terminal according to claim 1, wherein if said melody data contains no tone information, said tone setting means sets a ringing tone based on preset tone information.

3. The mobile communication terminal according to claim 1, wherein if said melody data contains tone information, said tone setting means judges the validity of said tone information.

4. The mobile communication terminal according to claim 3, wherein said tone setting means sets ringing tones by performing a modulation processing based on said tone information contained in said melody data.

5. The mobile communication terminal according to claim 4, wherein said tone information contained in said melody data constitutes tone parameters used for said modulation processing.

6. The mobile communication terminal according to claim 2, further comprising:

ringing-speed setting means for setting a tempo at which a melody is played in accordance with said melody data.

7. The mobile communication terminal according to claim 5, further comprising:

ringing-speed setting means for setting a tempo at which a melody is played in accordance with said melody data.

8. A ringing method for a mobile communication terminal equipped with a browser function, comprising the steps of:

having access to a server equipment by means of said browser function;

notifying said server equipment of desired melody data in conformity with said access;

receiving said desired melody data from said server equipment;

storing said desired melody data received in said receiving step;

judging whether said melody data stored in said storing step contains tone information;

fetching said tone information if said judging step judges that said melody data contains the tone information;

setting a tone for playing a melody in accordance with said melody data, based on said tone information fetched in said fetching step; and

playing said melody in said tone set in said setting step.

9. The ringing method for a mobile communication terminal according to claim 8, wherein if said melody data contains no tone information, said tone setting step sets a ringing tone based on preset tone information.

10. The ringing method for a mobile communication terminal according to claim 8, wherein if said melody data contains tone information, said tone setting step judges the validity of said tone information.

11. The ringing method for a mobile communication terminal according to claim 10, wherein said tone setting step sets ringing tones by performing a modulation processing based on said tone information contained in said melody data.

12. The ringing method for a mobile communication terminal according to claim 11, wherein said tone information contained in said melody data constitutes tone parameters used for said modulation processing.

13. The ringing method for a mobile communication terminal according to claim 9, further comprising a ringing-speed setting step of setting a tempo at which a melody is played in accordance with said melody data.

14. The ringing method for a mobile communication terminal according to claim 12, further comprising a ringing-speed setting step of setting a tempo at which a melody is played in accordance with said melody data.

* * * * *

US006366791B1

(12) **United States Patent**
Lin et al.

(10) **Patent No.: US 6,366,791 B1**
(45) **Date of Patent: Apr. 2, 2002**

(54) **SYSTEM AND METHOD FOR PROVIDING A MUSICAL RINGING TONE ON MOBILE STATIONS**

(75) Inventors: **Janette Chen Lin**, Dallas; **David Boltz**, Garland; **Walt Evanyk**, Plano, all of TX (US)

(73) Assignee: **Ericsson Inc.**, Research Triangle Park, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/336,427**

(22) Filed: **Jun. 17, 1999**

(51) **Int. Cl.**[7] **H04B 1/38**

(52) **U.S. Cl.** **455/567**; 455/466; 455/412; 379/373.01; 379/373.02; 379/373.04

(58) **Field of Search** 455/403, 412, 455/414, 418, 433, 466, 567; 379/373.01–373.05

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,866,766	A *	9/1989	Mitzlaff	379/373.02
4,868,561	A *	9/1989	Davis	379/373.02
5,452,354	A *	9/1995	Kyronlahti et al.	379/373.02
5,724,411	A *	3/1998	Eisdorfer et al.	379/373.02
5,870,683	A *	2/1999	Wells et al.	455/566
5,987,323	A *	11/1999	Huotari	455/433
6,094,587	A *	7/2000	Armanto et al.	455/566
6,138,006	A *	10/2000	Foti	455/414

* cited by examiner

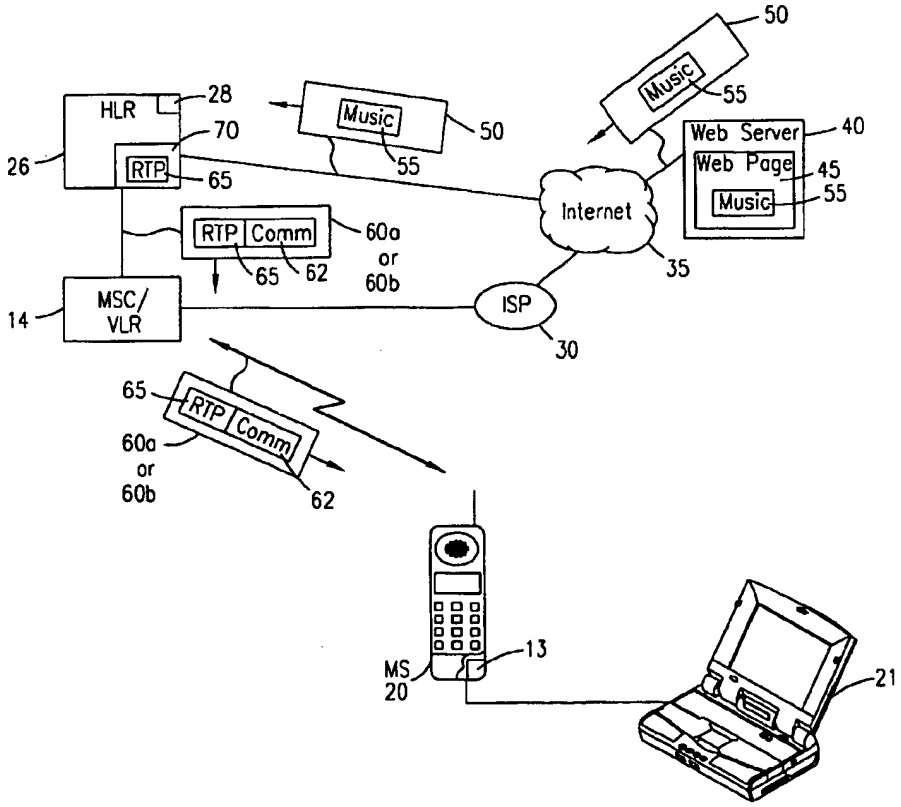
Primary Examiner—William Trost
Assistant Examiner—Simon Nguyen
(74) *Attorney, Agent, or Firm*—Jenkens & Gilchrist, P.C.

(57) **ABSTRACT**

A telecommunications system and method is disclosed for allowing network operators to download ringing tone pattern (s) associated with one or more musical scores to mobile stations (MSs) according to the music selection of mobile subscribers associated with the MSs. Once executed, the ringing tone pattern provides a musical ringing tone on the MS, instead of the normal ringing tone. In addition, ringing tone patterns can be used to enhance the "distinctive ringing" function within the MS. Thus, instead of using distinctive ringing patterns to represent different called party numbers, different music can be used.

31 Claims, 5 Drawing Sheets

- Different ringing tones for diff. called parties



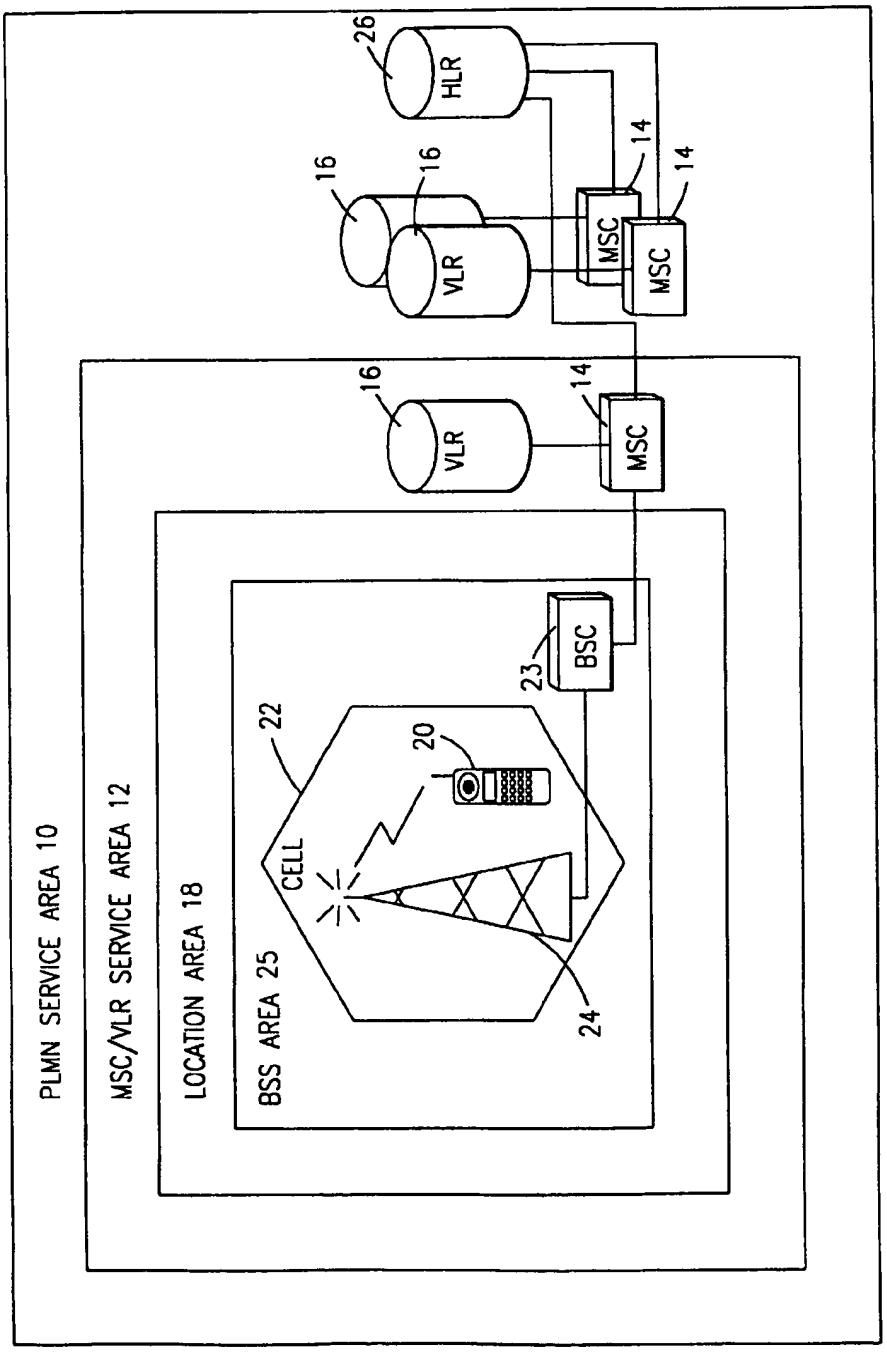

PLMN SERVICE AREA 10
MSC/VLR SERVICE AREA 12
LOCATION AREA 18
BSS AREA 25
CELL
HLR
VLR
VLR
VLR
MSC
MSC
MSC
BSC
26
16
16
16
14
14
14
23
22
20
24

FIG. 1

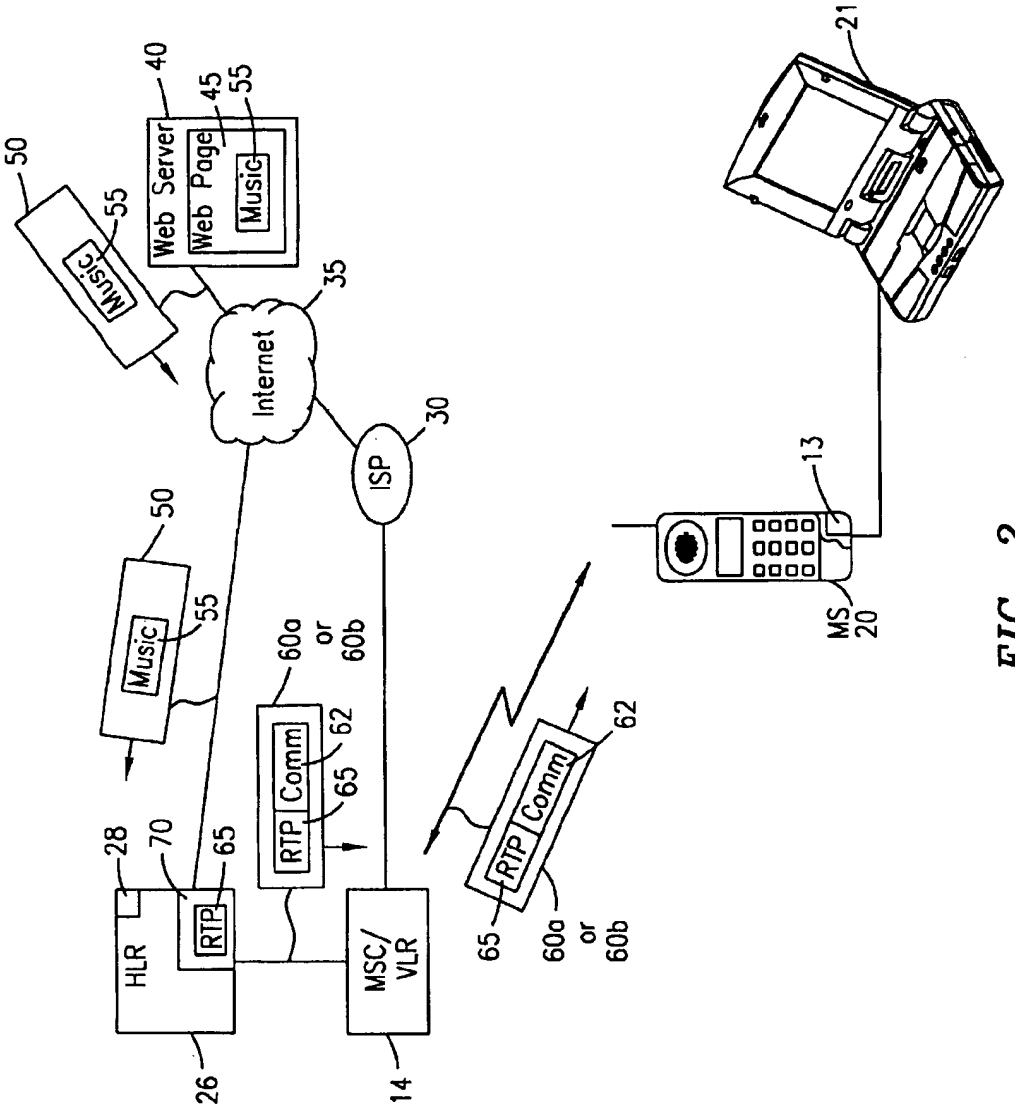

Web Server
Web Page
Music
Internet
ISP
HLR
RTP
MSC/
VLR
Comm
MS
20
13
21
14
26
28
30
35
40
45
50
55
60a
or
60b
62
65
70

FIG. 2

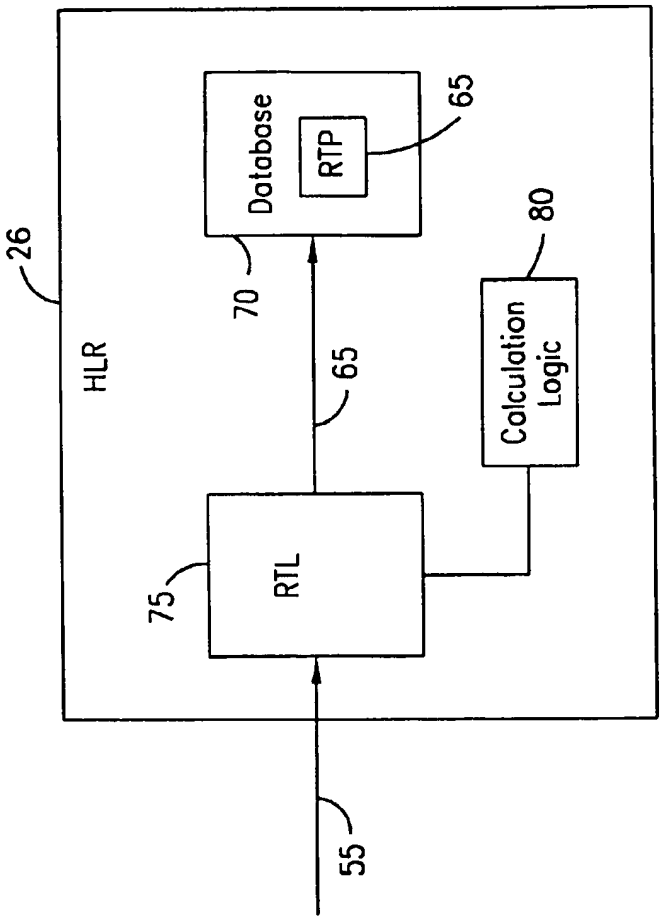


FIG. 3

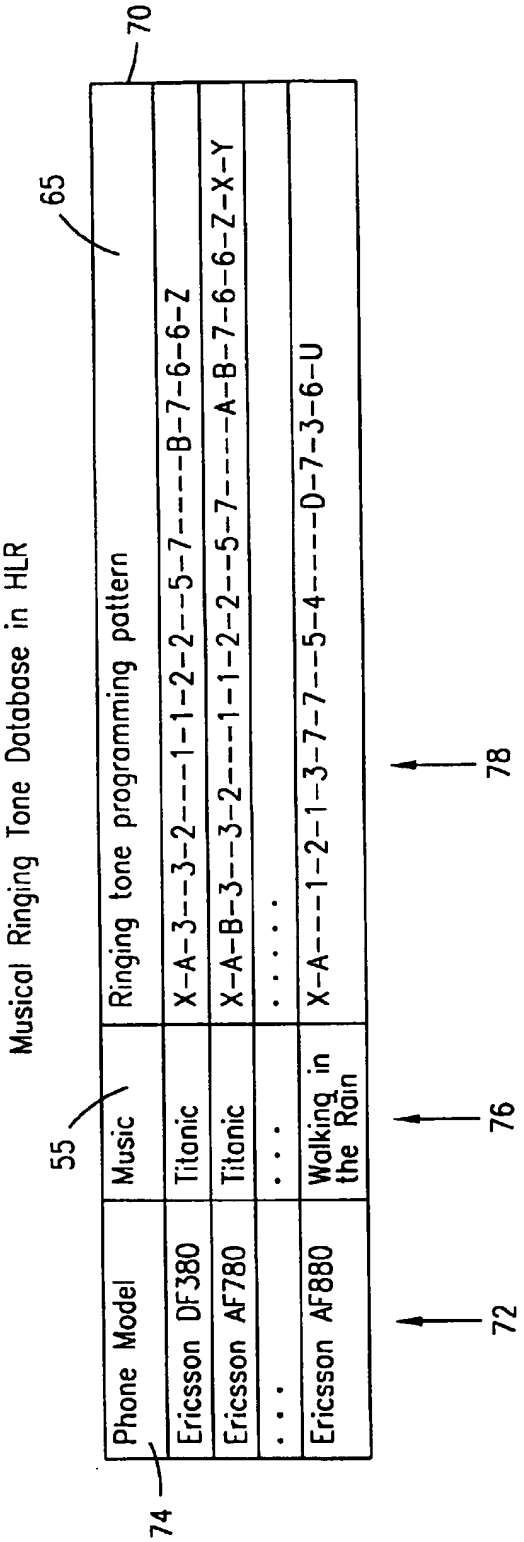

Musical Ringing Tone Database in HLR
55
65
70
74
72
76
78
Phone Model
Music
Ringing tone programming pattern
Ericsson DF380
Titanic
X-A-3--3-2---1-1-2-2--5-7----B-7-6-6-Z
Ericsson AF780
Titanic
X-A-B-3--3-2---1-1-2-2--5-7----A-B-7-6-6-Z-X-Y
. . .
. . .
. . . . .
Ericsson AF880
Walking in the Rain
X-A---1-2-1-3-7-7--5-4----D-7-3-6-U

FIG. 4

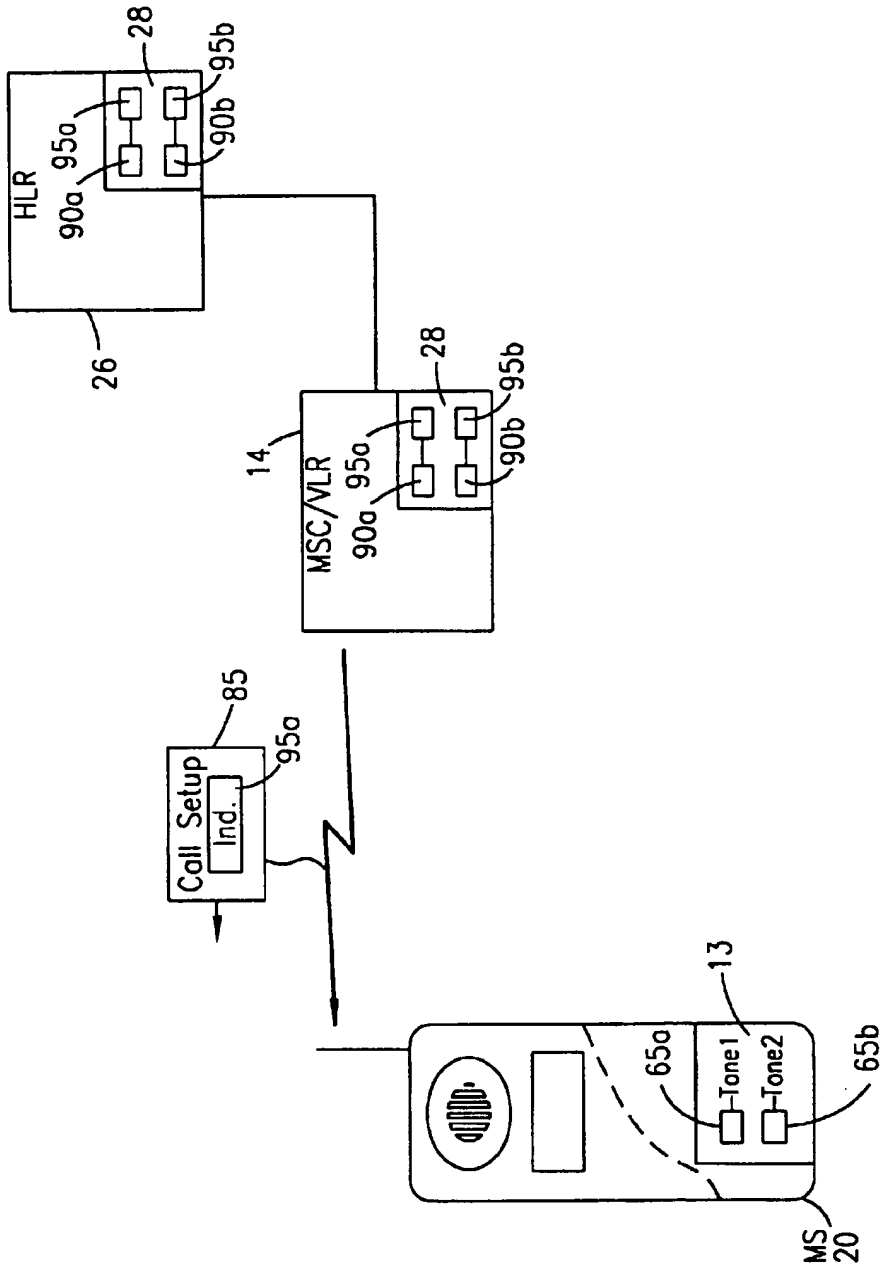

HLR
28
95b
90b
95a
90a
26
MSC/VLR
14
28
95b
90b
95a
90a
Call Setup
Ind.
85
95a
13
65a
Tone1
Tone2
65b
MS
20

FIG. 5

SYSTEM AND METHOD FOR PROVIDING A MUSICAL RINGING TONE ON MOBILE STATIONS

BACKGROUND OF THE PRESENT INVENTION

1. Field of the Invention

The present invention relates generally to telecommunications systems and methods for ringing mobile stations within a cellular network, and specifically to providing network ringing options to mobile subscribers.

2. Background of the Present Invention

Cellular telecommunications is one of the fastest growing and most demanding telecommunications applications. Today, it represents a large and continuously increasing percentage of all new telephone subscriptions around the world. There are currently two types of radio frequency access technologies for cellular systems: analog and digital technologies. Two common digital systems are the Digital Advanced Mobile Phone System (D-AMPS) and the Global System for Mobile Communication (GSM) system, which is perhaps the most widely used digital mobile cellular radio system.

With reference now to FIG. 1 of the drawings, a sample GSM Public Land Mobile Network (PLMN) **10** is illustrated. The PLMN **10** is composed of a plurality of areas **12**, each with a Mobile Switching Center (MSC) **14** and an integrated Visitor Location Register (VLR) **16** therein. The MSC/VLR areas **12**, in turn, include a plurality of Location Areas (LA) **18**, which are defined as that part of a given MSC/VLR area **12** in which a Mobile Station (MS) **20** may move freely without having to send update location information to the MSC/VLR area **12** that controls the LA **18**. Each LA **12** is also divided into a number of cells **22**. The MS **20** is the physical equipment, e.g., a car phone or other portable phone, used by mobile subscribers to communicate with the cellular network **10**, each other, and users outside the subscribed network, both wireline and wireless.

The MSC **14** is in communication with at least one Base Station Controller (BSC) **23**, which, in turn, is in contact with at least one Base Transceiver Station (BTS) **24**. The BTS **24** is the physical equipment, illustrated for simplicity as a radio tower, that provides radio coverage to the geographical part of the cell **22** for which it is responsible. It should be understood that the BSC **23** may be connected to several BTSs **24**, and may be implemented as a stand-alone node or integrated with the MSC **14**. In either event, the BSC **23** and BTS **24** components, as a whole, are generally referred to as a Base Station System (BSS) **25**.

With further reference to FIG. **1**, the PLMN Service Area or cellular network **10** includes a Home Location Register (HLR) **26**, which is a database maintaining all subscriber information, e.g., user profiles, current location information, International Mobile Subscriber Identity (IMSI) numbers, and other administrative information. The HLR **26** may be co-located with a given MSC **14**, integrated with the MSC **14**, or alternatively can service multiple MSCs **14**, the latter of which is illustrated in FIG. **1**.

The VLR **16** is a database containing information about all of the MSs **20** currently located within the MSC/VLR area **12**. If an MS **20** roams into a new MSC/VLR area **12**, the VLR **16** connected to that MSC **14** will request data about that MS **20** from the HLR database **26** (simultaneously informing the HLR **26** about the current location of the MS **20**). Accordingly, if the user of the MS **20** then wants to make a call, the local VLR **16** will have the requisite identification information without having to reinterrogate the HLR **26**. In the aforedescribed manner, the VLR and HLR databases **16** and **26**, respectively, contain various subscriber information associated with a given MS **20**.

A current popular trend is to program the MS **20** to ring with popular music, instead of the normal ringing tone. There is a series of books published by Futabasha Publishers Ltd., such as the book entitled "Ringing-tone for Cellular Phones, Do Re Mi" that teaches mobile subscribers how to program the musical ringing tone(s) into their MSs **20**. For example, a mobile subscriber can program his or her MS **20** to ring with a popular song by inputting symbols and/or numbers into his or her MS **20**.

However, programming the MS **20** directly by the mobile subscriber is not easy. Different MSs **20** require different programming methods. Thus, if a mobile subscriber purchases a new MS **20**, the programming technique used before may not work anymore. Therefore, many mobile subscribers may want the option of an alternative ringing tone without having to buy a book and program the MS **20** by themselves.

In addition, with the demand for alternative ringing tones rising, many network operators are looking for ways to capitalize on this trend. By allowing the mobile subscribers to program the musical tones into their MSs **20** themselves, the network operators are losing out on a potential source of revenue.

SUMMARY OF THE INVENTION

The present invention is directed to telecommunications systems and methods for allowing network operators to download ringing tone pattern(s) associated with one or more musical scores to mobile stations (MSs) according to the musical score selection of mobile subscribers associated with the MSs. Once executed, the ringing tone pattern provides a musical ringing tone on the MS, instead of the normal ringing tone. In addition, ringing tone patterns can be used to enhance the "distinctive ringing" function within the MS. Thus, instead of using distinctive ringing patterns to represent different called party numbers, different music can be used.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosed invention will be described with reference to the accompanying drawings, which show important sample embodiments of the invention and which are incorporated in the specification hereof by reference, wherein:

FIG. **1** is a block diagram of a sample Global System for Mobile Communications cellular network;

FIG. **2** illustrates the downloading of a ringing tone pattern to a mobile station to provide a musical ringing tone on the mobile station;

FIG. **3** illustrates a home location register for calculating, storing and downloading the ringing tone pattern;

FIG. **4** illustrates a database for storing the ringing tone pattern; and

FIG. **5** illustrates a distinctive ringing function on the mobile station using the ringing tone pattern.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EXEMPLARY EMBODIMENTS

The numerous innovative teachings of the present application will be described with particular reference to the

presently preferred exemplary embodiments. However, it should be understood that this class of embodiments provides only a few examples of the many advantageous uses of the innovative teachings herein. In general, statements made in the specification of the present application do not necessarily delimit any of the various claimed inventions. Moreover, some statements may apply to some inventive features but not to others.

With reference now to FIG. **2** of the drawings, network operators can offer a musical ringing tone feature to mobile subscribers to allow mobile subscribers to select musical scores **55** for the ringing tone of their Mobile Stations (MSs) **20**, without the need for the mobile subscribers to program their MSs **20** themselves. In order to automatically program the MS **20** to ring with the music score **55** selection(s) of a mobile subscriber, ringing tone patterns **65** associated with the selected musical score(s) **55** can be downloaded to the MS **20**. When implemented on the MS **20**, the ringing tone patterns **65** provide a musical ringing tone corresponding to the selected musical score **55**, instead of the normal ringing tone.

In order to download the desired ringing tone patterns **65**, the mobile subscriber can either call the network operator to select the desired musical score **55** or access the network operator through an Internet **35**, the latter being illustrated. For example, the mobile subscriber can access a web page **45** of the network operator from a stand-alone computer **21** or from the MS **20** that has either a laptop computer **21** attached to it, as is shown, or a computer **21** integrated with it.

As shown in FIG. **2**, if the MS **20** with the attached computer **21** wants to access the web page **45** of the network operator that provides different popular musical score **55** selections for ringing tones, the MS **20** can dial a number associated with an Internet Service Provider (ISP) **30**, or other entity providing access to the Internet **35** to establish a call connection with the ISP **30** via a Mobile Switching Center (MSC) **14**, which is a combined MSC/Visitor Location Register (VLR), serving the MS **20**. Thereafter, the mobile subscriber can enter on the computer **21** a Universal Resource Locator (URL) (not shown) identifying the web page **45** of the network operator. This URL is transmitted to the ISP **30** via the MS **20** and the MSC **14**. The ISP **30**, using the entered URL, routes the call through the Internet **35** to a web server **40** storing the requested web page **45** and establishes a connection with that web server **40**.

Once the web page **45** is located, the web page **45** is downloaded through the Internet **35** onto the computer **21**. At this point, the mobile subscriber can access a subscriber record **28** associated with the MS **20** that is stored on the web page **45** or within in a Home Location Register (HLR) **26**, the latter being illustrated, and select the desired musical score(s) **55** based upon the model number of the MS **20** to receive the selected musical score(s) **55**. The model number of the MS **20** is preferably provided by the mobile subscriber. However, in some cases, the subscriber record **28** may store MS **20** model number information.

It should be understood that prior to allowing the mobile subscriber to access the subscriber record **28**, the identity of the mobile subscriber is first authenticated. Fees for each musical score **55** can be displayed to the mobile subscriber on the computer **21**, and acceptance of these fees provided by the mobile subscriber to the network operator via the web page **45** prior to initiating downloading of the selected musical score(s) **55**.

Once selected and confirmed, the network operator sends a message **50** to the HLR **26** associated with the MS **20**, instructing the HLR **26** to download the selected musical score(s) **55** to the MS **20** from the web page **45**. As is shown, this message **50** could be sent from the web page **45** through the Internet **35**. In response to the message **50**, the HLR **26** retrieves the ringing tone pattern **65** associated with the selected musical scores(s) **55** from a database **70** therein and downloads this ringing tone pattern **65** to the MS **20**. Alternatively, the web page **45** itself could download the selected musical score(s) **55** to the MS **20**. In this case, the musical score(s) **55** could be stored within the web page **45** or within a node (not shown) accessible to the web page **45**.

If the MS **20** is within the Global System for Mobile Communications (GSM) system, the MS **20** has a memory **13** therein, such as a Subscriber Identity Module (SIM) card, for storing subscriber related information. Therefore, as an example, in the GSM system, this ringing tone pattern **65** can be downloaded to the MS **20** using a SIM Application Toolkit (SAT) download procedure. A new SIM AN;4 command and/or parameter **62** along with the ringing tone pattern **65** can be sent from the HLR **26** or the web page **45** to the MS **20** using a Short Message Service (SMS) message **60***a* or Unstructured Supplementary Service Data (USSD) message **60***b* via the MSC/VLR **14** serving the MS **20**. It should be understood that if an SMS message **60***a* is sent, the SMS message **60***a* is sent to the MSC/VLR **14** from a Short Message Service Center (SMSC) (not shown). Once received, the new SIM command or parameter **62** triggers the SIM card **13** within the MS **20** to program the ringing of the MS **20** according to the received ringing tone pattern **65**.

The above solution applies to GSM systems. However, it should be understood that the downloading of ringing tone patterns **65** to MSs **20** can be implemented within any type of cellular system. For example, within the Digital Advance Mobile Phone System (D-AMPS), instead of using a SIM Application Toolkit download procedure, the ringing tone pattern **65** can be downloaded from the HLR **26** to the memory **13** within the MS **20** using, for example, an SMS message **60***a*.

With reference now to FIG. **3** of the drawings, preferably, a database **70** within the web page **45** (shown in FIG. **2**) or the HLR **26**, the latter being illustrated, contains the ringing tone patterns **65** for each available musical score **55**. Once the network operator selects the musical scores **55** and provides these to ringing tone logic **75** within the HLR **26**, the ringing tone logic **75** accesses calculation logic **80** within the HLR **26** to calculate the ringing tone patterns **65** for each of these musical scores **55** for each type of MS **20**. Once calculated, the ringing tone logic **75** stores each of these calculated ringing tone patterns **65** within the database **70**. It should be understood that the database **70** can be located within the HLR **26**, within the web page **45** or within a separate node (not shown) accessible by the web page **45** or HLR **26** through, for example, a Service Control Point (SCP) (not shown) if the ringing tone feature is an Advanced Intelligent Network (AIN) feature.

An example of the type of information stored in the database **70** is shown in FIG. **4** of the drawings. In a first column **72**, there is a listing of model numbers **74** for MSs **20**. In a second column **76**, each musical score **55** is listed for each of the MS model numbers **74** listed in the first column **72**. Finally, in a third column **78**, the calculated ringing tone pattern **65** for the associated musical score **55** and MS model number **74** is listed. The ringing tone logic **75** within the HLR **26** indexes on the requesting MS **20** model number **74**, which is determined from the subscriber record **28** associated with the requesting MS **20** or provided by the mobile subscriber, and the selected musical score **55** asso-

ciated with that model number **74** to retrieve the ringing tone pattern **65** to be downloaded to the MS **20**.

With reference now to FIG. **5** of the drawings, in an alternative embodiment, the downloading of ringing tone patterns **65** can be used to enhance the "distinctive ringing" function available on MSs **20**. Today, many network operators support multiple types of ringing patterns to distinctively identify different called party numbers associated with the same mobile subscriber. For example, one MS **20** may have two phone numbers, X and Y, associated with it. When someone reaches the MS **20** with the number X, the MS **20** rings with one ringing pattern, whereas when someone reaches the same MS **20** with the other number, Y, the MS **20** rings with a different pattern. Judging from the ringing pattern, the mobile subscriber can tell which number he/she is reached by.

By applying the present invention to the existing distinctive ringing function, instead of using distinctive ringing patterns to represent different called party numbers, different music can be used. Therefore, the mobile subscriber can call the network operator or access the web page (**45** shown in FIG. **2**) associated with the network operator and select a different musical score **55** for each B-number **90** (called party number) associated with the MS **20**. The different ringing tone patterns **65** associated with each of the selected musical scores **55** can be downloaded to the MS **20**, along with an indication of the associated B-number **90**.

For example, if the MS **20** has two B-numbers **90***a* and **90***b* associated with it, the HLR **26** could download via the MSC/VLR **14** a first ringing tone pattern **65***a* associated with a first musical score **55***a* to the memory **13** within the MS **20**, and instruct the MS **20** to label it "Tone 1." Thereafter, the HLR **26** can download a second ringing tone pattern **65***b* associated with a second musical score **55***b* to the MS **20**, and instruct the MS **20** to label it "Tone 2." In addition, within the subscriber record **28** associated with the MS **20**, the HLR **26** can store a first indication **95***a* that "Tone 1" should be used for the first B-number **90***a* and a second indication **95***b* that "Tone 2" should be used for the second B-number **90***b*.

When the MS **20** registers with a serving MSC/VLR **14**, these indications **95***a* and **95***b* and associated B-numbers **90***a* and **90***b*, respectively, are also stored within the MSC/VLR **14**. Thus, when an incoming call is received by the MSC/VLR **14** to one of the B-numbers **90***a* or **90***b*, which in FIG. **5** is the first B-number **90***a*, the MSC/VLR **14** includes in a call setup message **85** to the MS **20** the first indication **95***a* to use "Tone 1" to ring the MS **20**. When the MS **20** uses the first ringing tone pattern **65***a* to ring with the musical score **55***a* associated with "Tone 1," the mobile subscriber realizes that the incoming call is directed to the first B-number **90***a*.

As will be recognized by those skilled in the art, the innovative concepts described in the present application can be modified and varied over a wide range of applications. Accordingly, the scope of patented subject matter should not be limited to any of the specific exemplary teachings discussed, but is instead defined by the following claims.

What is claimed is:

1. A telecommunications system for providing a musical ringing tone on a mobile station within a cellular network, comprising:

a database for storing a plurality of ringing tone patterns, each of said ringing tone patterns being associated with one of a plurality of musical scores and calculated for each of a plurality of different mobile station types; and

a node for receiving a select one of said plurality of musical scores from a mobile subscriber associated with said mobile station, accessing said database to retrieve a select one of said plurality of ringing tone patterns associated with said select musical score and said mobile station type of said mobile station and downloading said select ringing tone pattern to said mobile station.

2. The telecommunications system of claim **1**, wherein said mobile station further comprises:

a memory for storing said select ringing tone pattern.

3. The telecommunications system of claim **2**, wherein said memory is a Subscriber Identity Module card.

4. The telecommunications system of claim **3**, wherein said node transmits a parameter to said Subscriber Identity Module card within said mobile station instructing said Subscriber Identity Module card to program the ringing of said mobile station with said select ringing tone pattern.

5. The telecommunications system of claim **4**, wherein said parameter is included within a Short Message Service message.

6. The telecommunications system of claim **4**, wherein said parameter is included within an Unstructured Supplementary Service Data message.

7. The telecommunications system of claim **1**, wherein said database further comprises a plurality of mobile station model numbers, each of said mobile station model numbers having each of said musical scores associated therewith, each of said ringing tone patterns associated with each of said musical scores being different for each of said mobile station model numbers.

8. The telecommunications system of claim **7**, wherein said mobile station has a select mobile station model number associated therewith, said select ringing tone pattern being associated with said select mobile station model number.

9. The telecommunications system of claim **1**, wherein said node is a home location register, said database being located within said home location register.

10. The telecommunications system of claim **1**, wherein said node further calculates each of said ringing tone patterns using said respective musical scores and stores said ringing tone patterns within said database.

11. The telecommunications system of claim **1**, wherein said mobile station provides said musical ringing tone on said mobile station using said select ringing tone pattern in response to receiving an incoming call to said mobile station.

12. The telecommunications system of claim **1**, wherein said mobile station has at least two B-numbers associated therewith, said node downloading at least said select ringing tone pattern for a first one of said at least two B-numbers and a second one of said ringing tone patterns associated with a second musical score for a second one of said at least two B-numbers.

13. The telecommunications system of claim **12**, further comprising:

a home location register for storing a subscriber record associated with said mobile station, said subscriber record storing a first indication to use said select ringing tone pattern associated with said first B-number and a second indication to use said second ringing tone pattern associated with said second B-number.

14. The telecommunications system of claim **13**, further comprising:

a mobile switching center in wireless communication with said mobile station for receiving an incoming call to a select one of said at least two B-numbers associated with said mobile station, said first and second indications being downloaded to said mobile switching center

from said home location register, said mobile switching center transmitting a select one of said first and second indications associated with said select B-number to said mobile station, said mobile station using said select indication to provide said musical ringing tone associated with said select B-number on said mobile station.

15. The telecommunications system of claim **1**, wherein said node is a web page associated with said cellular network.

16. A method for providing a musical ringing tone on a mobile station within a cellular network, comprising the steps of:

storing within a database a plurality of ringing tone patterns, each of said ringing tone patterns being associated with one a plurality of musical scores and calculated for each of a plurality of different mobile station types;

receiving, at a node, a select one of said plurality of musical scores from a mobile subscriber associated with said mobile station;

retrieving, by said node, from said database a select one of said plurality of ringing tone patterns associated with said select musical score and said mobile station type of said mobile station; and

downloading said select ringing tone pattern from said node to said mobile station.

17. The method of claim **16**, wherein said step of downloading further comprises the step of:

storing said select ringing tone pattern within-a memory in said mobile station.

18. The method of claim **17**, wherein said step of downloading further comprises the step of:

transmitting a parameter to said memory within said mobile station instructing said memory to program the ringing of said mobile station with said select ringing tone pattern.

19. The method of claim **16**, wherein said step of storing further comprises the step of:

storing within said database a plurality of mobile station model numbers, each of said mobile station model numbers having each of said musical scores associated therewith, each of said ringing tone patterns associated with each of said musical scores being different for each of said mobile station model numbers.

20. The method of claim **17**, wherein said mobile station has a select mobile station model number associated therewith, said step of retrieving further comprising the step of:

retrieving said select ringing tone pattern associated with said select mobile station model number.

21. The method of claim **16**, wherein said step of storing further comprises the step of:

calculating each of said ringing tone patterns using said respective musical scores.

22. The method of claim **16**, further comprising the step of:

providing said musical ringing tone on said mobile station using said select ringing tone pattern in response to receiving an incoming call to said mobile station.

23. The method of claim **16**, wherein said mobile station has at least two B-numbers associated therewith, said step of downloading further comprising the steps of:

downloading said select ringing tone pattern for a first one of said at least two B-numbers; and

downloading a second one of said ringing tone patterns associated with a second musical score for a second one of said at least two B-numbers.

24. The method of claim **23**, further comprising the steps of:

storing within a subscriber record within a home location register associated with said mobile station a first indication to use said select ringing tone pattern associated with said first B-number; and

storing within said subscriber record a second indication to use said second ringing tone pattern associated with said second B-number.

25. The method of claim **24**, wherein said step of providing further comprises the steps of:

downloading said first and second indications from said home location register to a mobile switching center in wireless communication with said mobile station; and

receiving an incoming call to a select one of said at least two B-numbers associated with said mobile station.

26. The method of claim **25**, wherein said step of providing further comprises the steps of:

transmitting a select one of said first and second indications associated with said select B-number from said mobile switching center to said mobile station; and

providing said musical ringing tone associated with said select B-number on said mobile station using said select indication.

27. The method of claim **16**, wherein said step of receiving further comprises the steps of:

receiving said select musical score at a web page associated with said cellular network.

28. A home location register for downloading a musical ringing tones to a mobile station, comprising:

a database for storing a plurality of ringing tone patterns, each of said ringing tone patterns being associated with one of a plurality of musical scores and calculated for each of a plurality of different mobile station types; and

ringing tone logic for receiving a select one of said plurality of musical scores from a mobile subscriber associated with said mobile station, accessing said database to retrieve a select one of said plurality of ringing tone patterns associated with said select musical score and said mobile station type of said mobile station and downloading said select ringing tone pattern to said mobile station.

29. The home location register of claim **28**, wherein said database further comprises a plurality of mobile station model numbers, each of said mobile station model numbers having each of said musical scores associated therewith, each of said ringing tone patterns associated with each of said musical scores being different for each of said mobile station model numbers.

30. The home location register of claim **29**, wherein said mobile station has a select mobile station model number associated therewith, said select ringing tone pattern being associated with said select mobile station model number.

31. The home location register of claim **28**, further comprising:

calculation logic for calculating each of said ringing tone patterns using said respective musical scores, said ringing tone logic storing each of said calculated ringing tone patterns within said database.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,366,791 B1
DATED : April 2, 2002
INVENTOR(S) : Janette Chen Lin et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 4,
Line 18, delete "AN;4"

Signed and Sealed this

First Day of October, 2002

Attest:

Attesting Officer

JAMES E. ROGAN
Director of the United States Patent and Trademark Office

US006052442A

United States Patent [19]

Cooper et al.

[11] Patent Number: 6,052,442

[45] Date of Patent: Apr. 18, 2000

[54] **INTERNET ANSWERING MACHINE**

[75] Inventors: **R. Ross Cooper**, La Mesa; **Robert T. Kulakowski**, Leucadia, both of Calif.

[73] Assignee: **Internet Magic, Inc.**, San Diego, Calif.

[21] Appl. No.: **08/978,214**

[22] Filed: **Nov. 25, 1997**

Related U.S. Application Data

[63] Continuation of application No. 08/554,744, Nov. 7, 1995, abandoned.

[51] **Int. Cl.**[7] **H04M 1/64**

[52] **U.S. Cl.** **379/88.19**; 379/93.24

[58] **Field of Search** 379/67.1, 88.12, 379/88.17, 88.19, 88.2, 88.21, 90.01, 93.01, 93.24, 142

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,701,850	10/1972	Ando .	
4,803,717	2/1989	Marui .	
4,837,797	6/1989	Freeny, Jr. .	
4,935,954	6/1990	Thompson et al.	379/89
5,172,404	12/1992	Hashimoto .	
5,243,642	9/1993	Wise, Jr. et al. .	
5,278,896	1/1994	Sakata et al. .	
5,313,516	5/1994	Afshar et al. .	
5,333,152	7/1994	Wilber .	
5,333,266	7/1994	Boaz et al. .	
5,384,832	1/1995	Zimmerman et al. .	
5,390,236	2/1995	Klausner et al. .	
5,392,332	2/1995	Core et al. .	
5,396,546	3/1995	Remillard .	
5,398,280	3/1995	Macconnell .	
5,400,393	3/1995	Knuth et al. .	
5,402,466	3/1995	Delahanty .	
5,418,628	5/1995	Perkins .	
5,452,289	9/1995	Sharma et al. .	
5,526,408	6/1996	Yekutiely .	
5,557,659	9/1996	Hyde-Thompson .	
5,568,540	10/1996	Greco et al. .	
5,579,472	11/1996	Keyworth, II et al. .	
5,608,786	3/1997	Gordon .	
5,727,047	3/1998	Bentley et al.	379/93
5,757,891	5/1998	Wang	379/93.24
5,822,692	10/1998	Krishan et al.	455/419

FOREIGN PATENT DOCUMENTS

0330856	6/1989	European Pat. Off. .

OTHER PUBLICATIONS

Palaniappan et al., InternetExpress: An inter–Desktop Multimedia Data–Transfer Service, IEEE, Oct. 10, 1991, pp. 58–67.

Primary Examiner—Scott L. Weaver

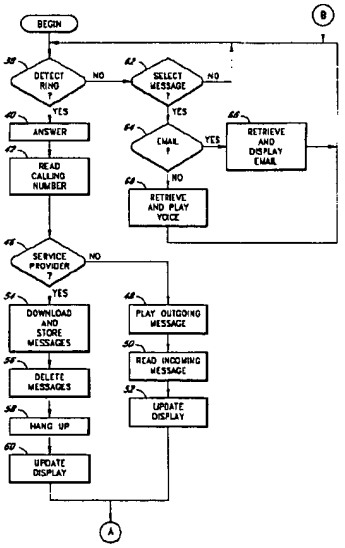
Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP

[57] **ABSTRACT**

An answering machine receives and records both voice and email messages. The answering machine includes a telephone line interface, a modem, a processor, memory for storing the processor software and recording the messages, a speaker, a display and a keypad. When the answering machine detects a ring signal on the telephone line to which it is connected, it answers the call. The answering machine plays an outgoing message for the caller to hear and records the caller's incoming voice message. Periodically or at predetermined times, the answering machine may check for email messages by calling a service provider. When the service provider answers the call, the answering machine logs in, downloads and stores at least a portion of email messages that have been received. A user can view the display and review the messages. Voice mail messages are played through the speaker, and email messages are provided on the display.

5 Claims, 7 Drawing Sheets

- answering machine reads "caller ID" and downloads e-mail messages from service provider



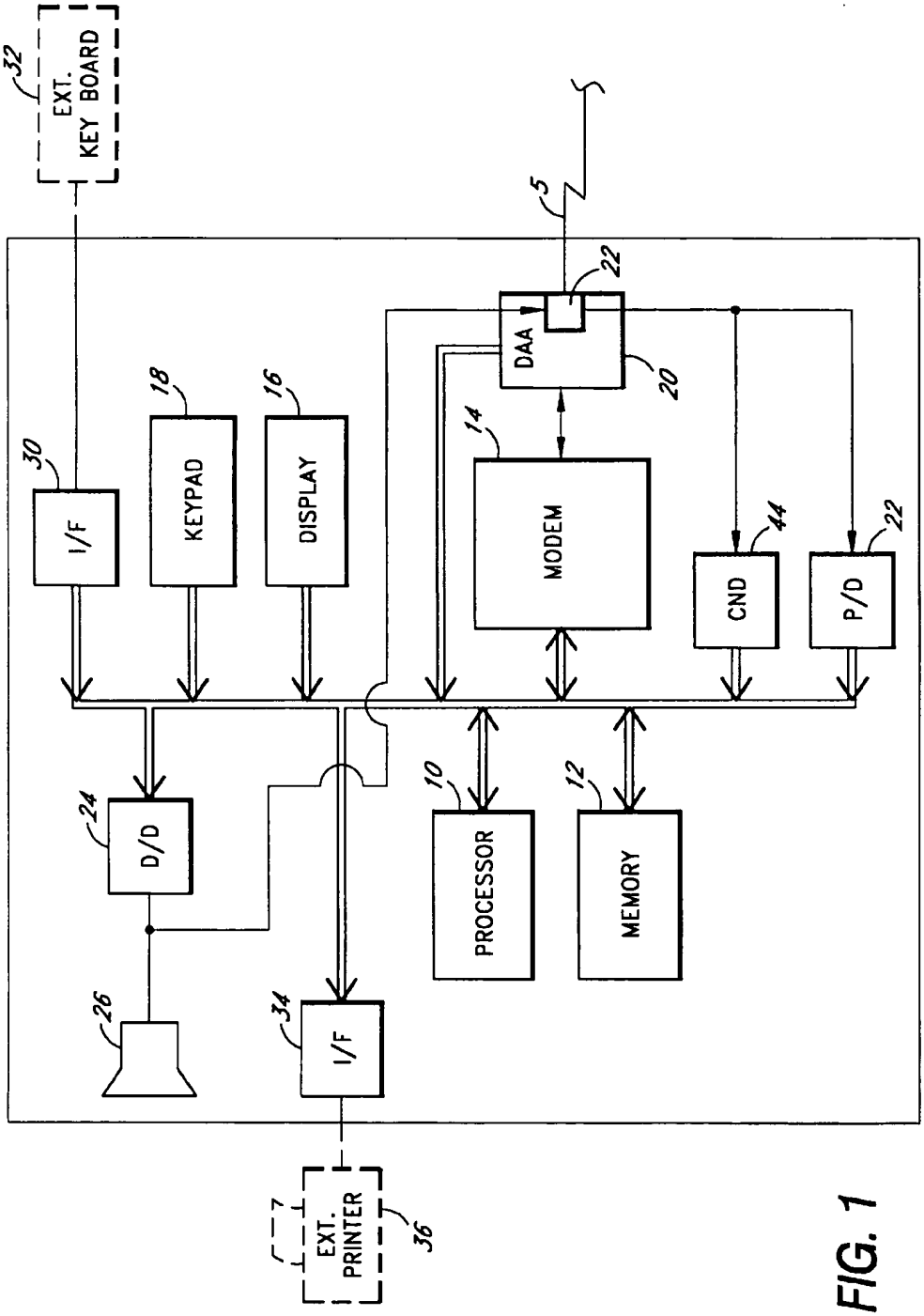

32
EXT. KEY BOARD
5
22
DAA
20
18
KEYPAD
16
DISPLAY
14
MODEM
30
I/F
44
CND
22
P/D
24
D/D
10
PROCESSOR
12
MEMORY
26
34
I/F
7
EXT. PRINTER
36

FIG. 1

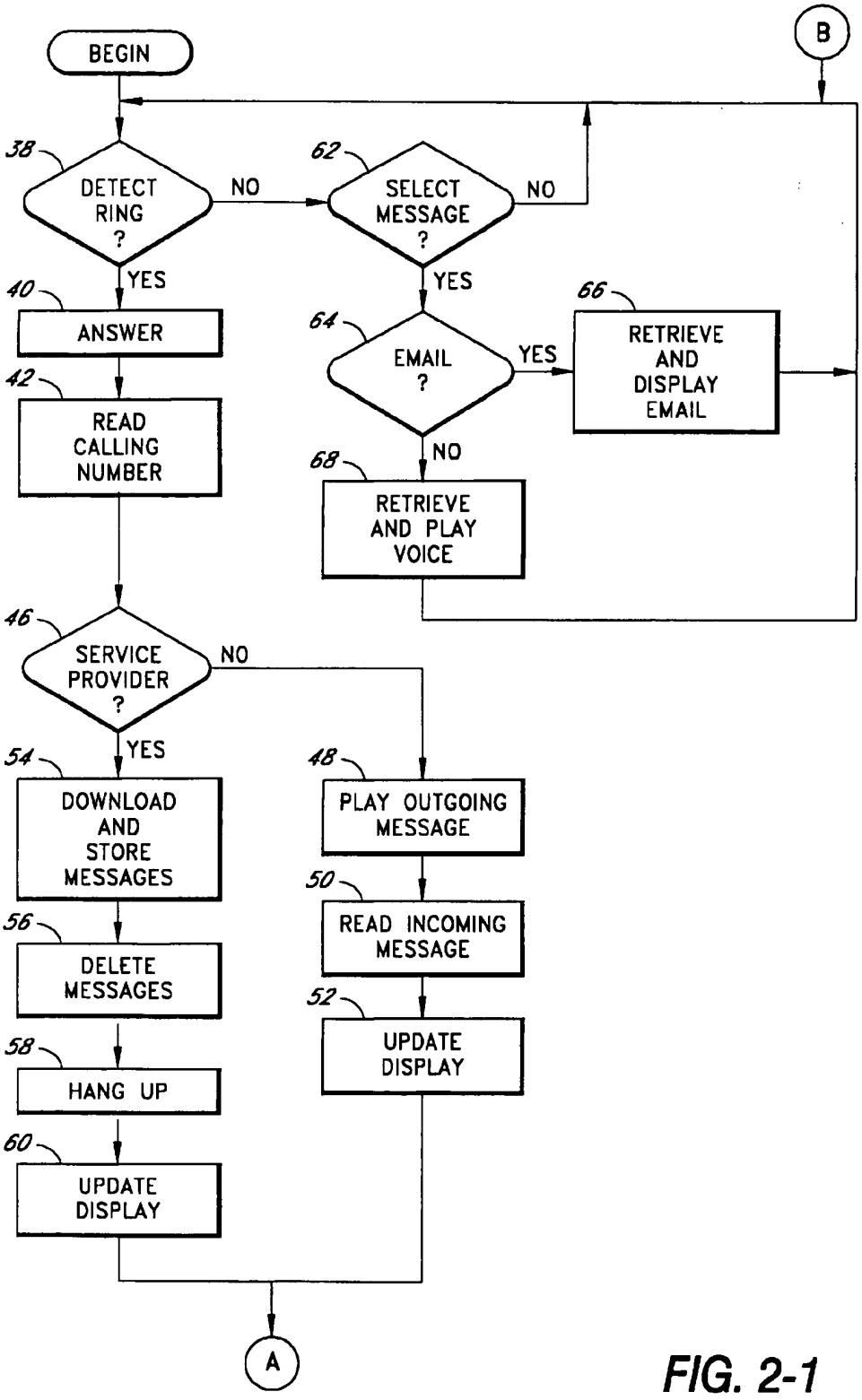

BEGIN
B
38
DETECT RING ?
NO
62
SELECT MESSAGE ?
NO
YES
YES
40
ANSWER
64
EMAIL ?
YES
66
RETRIEVE AND DISPLAY EMAIL
42
READ CALLING NUMBER
NO
68
RETRIEVE AND PLAY VOICE
46
SERVICE PROVIDER ?
NO
YES
54
DOWNLOAD AND STORE MESSAGES
48
PLAY OUTGOING MESSAGE
50
READ INCOMING MESSAGE
56
DELETE MESSAGES
52
UPDATE DISPLAY
58
HANG UP
60
UPDATE DISPLAY
A

FIG. 2-1

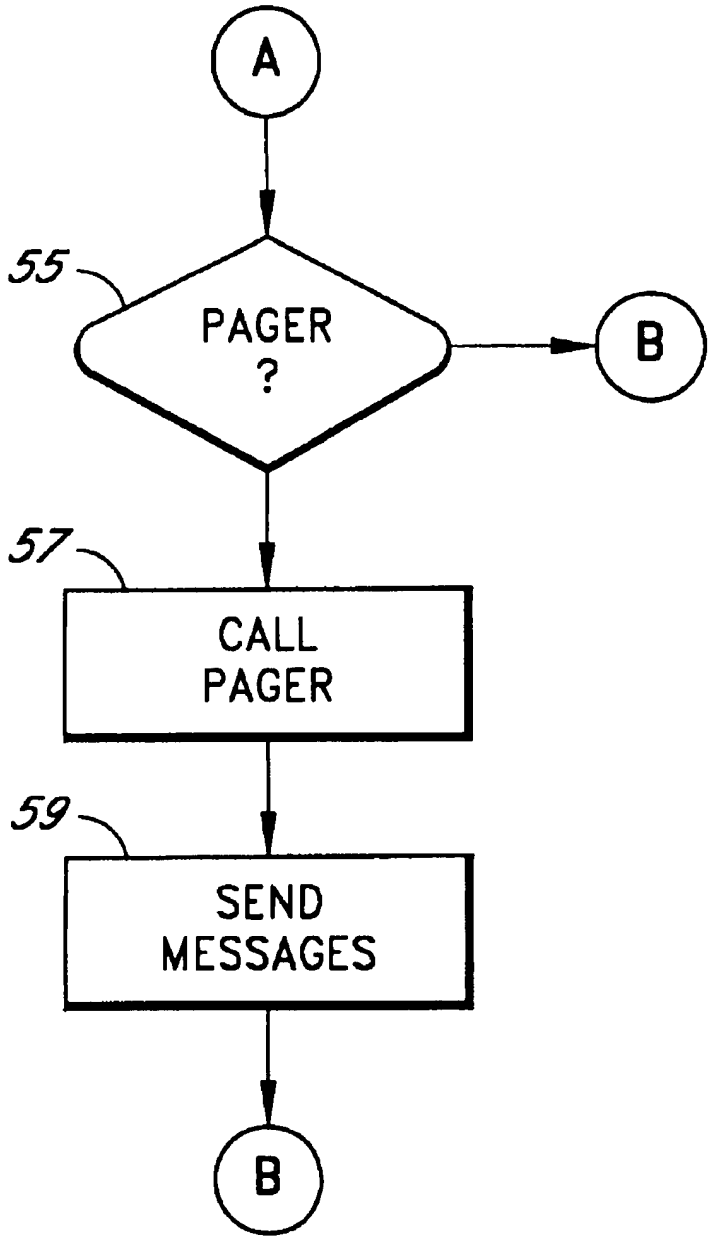


FIG. 2-2

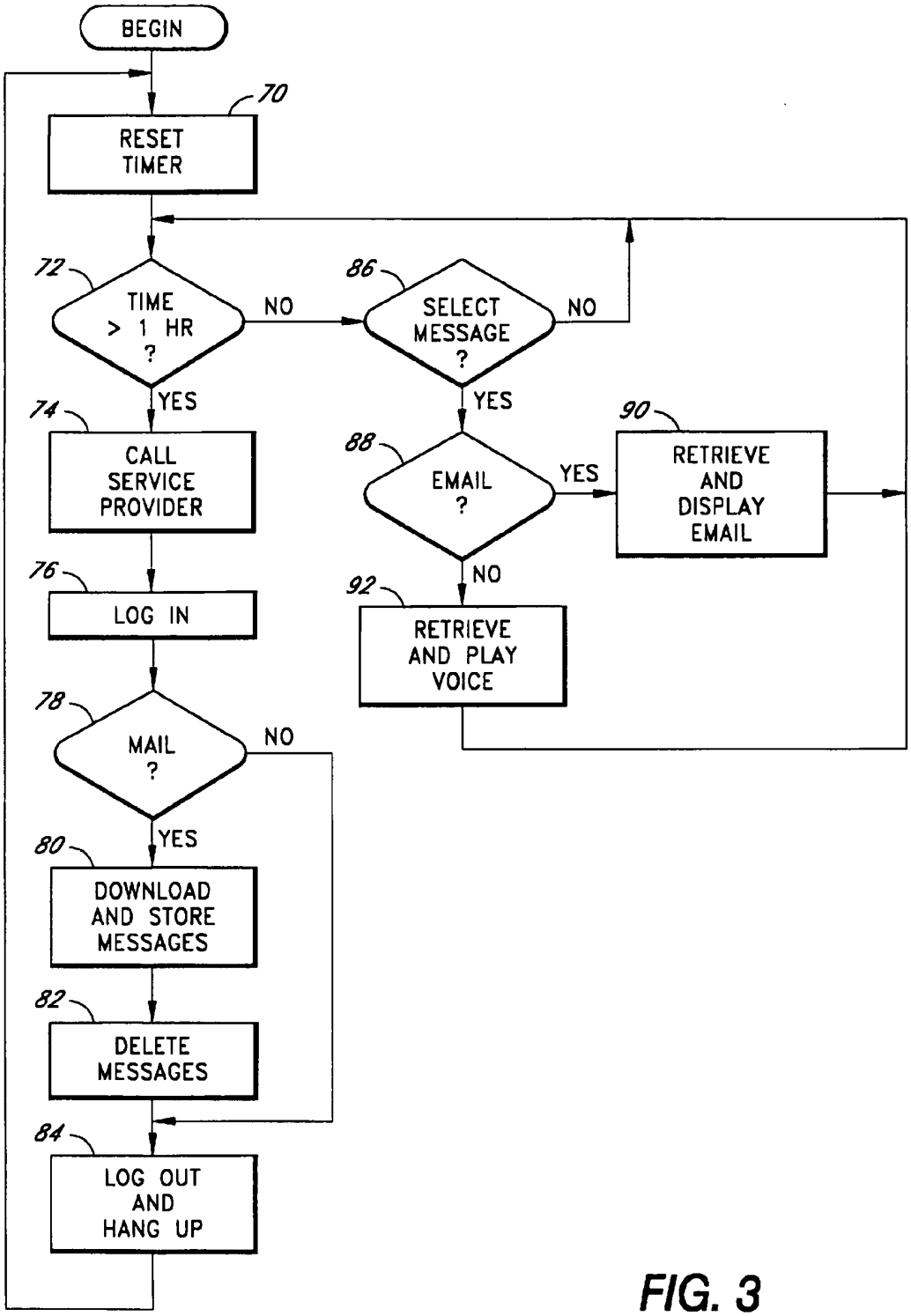

BEGIN
70
RESET TIMER
72
TIME > 1 HR ?
NO
86
SELECT MESSAGE ?
NO
YES
YES
74
CALL SERVICE PROVIDER
88
EMAIL ?
YES
90
RETRIEVE AND DISPLAY EMAIL
NO
92
RETRIEVE AND PLAY VOICE
76
LOG IN
78
MAIL ?
NO
YES
80
DOWNLOAD AND STORE MESSAGES
82
DELETE MESSAGES
84
LOG OUT AND HANG UP

FIG. 3

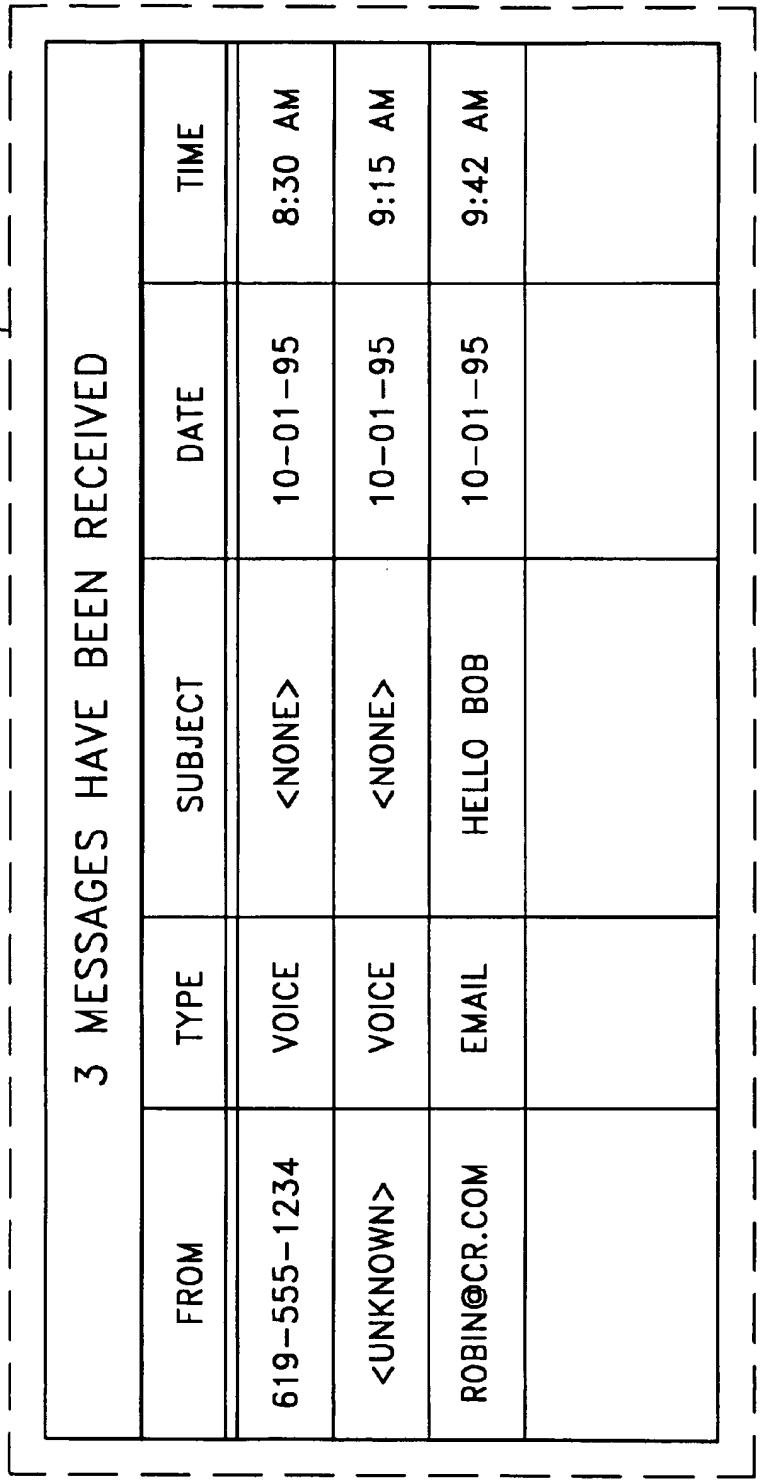

16
3 MESSAGES HAVE BEEN RECEIVED
FROM
TYPE
SUBJECT
DATE
TIME
619-555-1234
VOICE
<NONE>
10-01-95
8:30 AM
<UNKNOWN>
VOICE
<NONE>
10-01-95
9:15 AM
ROBIN@CR.COM
EMAIL
HELLO BOB
10-01-95
9:42 AM

FIG. 4

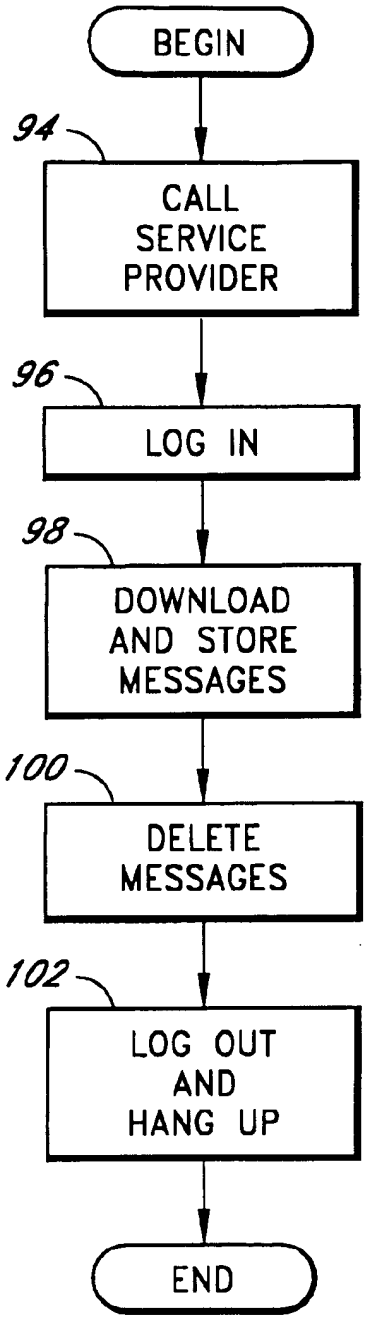

BEGIN
94
CALL SERVICE PROVIDER
96
LOG IN
98
DOWNLOAD AND STORE MESSAGES
100
DELETE MESSAGES
102
LOG OUT AND HANG UP
END

FIG. 5

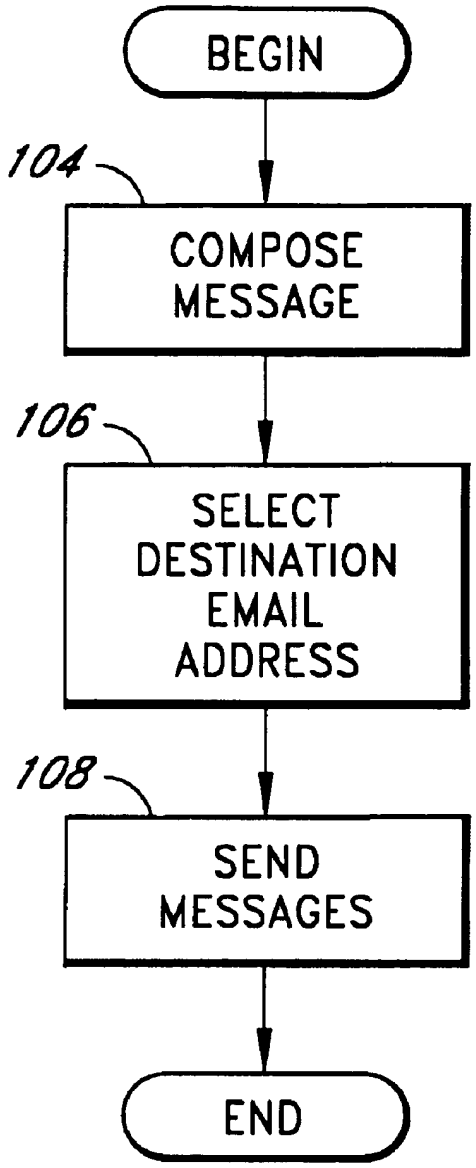

BEGIN
104
COMPOSE MESSAGE
106
SELECT DESTINATION EMAIL ADDRESS
108
SEND MESSAGES
END

FIG. 6

INTERNET ANSWERING MACHINE

This application is a continuation of U.S. patent application Ser. No. 08/554,744, filed Nov. 7, 1995 now abandoned.

BACKGROUND OF THE INVENTION

A telephone answering machine is an electronic device that automatically answers an incoming telephone call, plays a pre-recorded message, and records a message that the caller leaves. The machine typically has one or two magnetic tape cassettes or a digital memory for storing the outgoing and incoming messages. The machine may have a display for indicating the number of messages received and the time and date they were received. A user can listen to the recorded messages using controls on the machine or via a remote telephone connection by pressing keys on the remote telephone keypad.

Although an answering machine is traditionally a dedicated, integrated device that plugs into the telephone line, a general-purpose personal computer may also perform the above-described answering machine functions. Circuit cards and associated software to facilitate answering machine functions are commercially available for personal computers. As a result, the computer may display on its screen the number of received messages and time of day they were received and may play back the recorded messages through its speakers.

An increasingly common method for sending messages is known as electronic mail ("email"). A person can use a remote computer and modem to send messages to a central computer via a telephone connection. The central computer stores the message as well as the identity of the sender and intended recipient. The recipient can use another remote computer and modem to establish a telephone connection with the central computer and read or download any messages stored there that are intended for him to receive. An email message generally includes ASCII-encoded text and may also include an "attachment" consisting of a digitized image or digitized audio (voice). Companies having such central computers that facilitate email communication between remote users are known generally as "on-line service providers." People who wish to use the email service pay fees to the on-line service provider and are known as subscribers or customers. Examples of well-known on-line service providers include COMPUSERVE, PRODIGY, AMERICA ON-LINE, FIDONET and BITNET.

Many on-line service providers also provide access to the computer network known as the Internet. The Internet is a global super-network comprising numerous sub-networks. The service provider maintains a computer on one of the sub-networks that functions as a "gateway" onto the Internet for its customers' computers. People all over the world can send and receive email with each other through service providers that provide Internet gateways. Service providers use standard, well-known protocols to send and receive email via the Internet, such as Simple Mail Transfer Protocol (SMTP) and Post Office Protocol (POP), which are part of the suite of over 100 protocols known as Transmission Control Protocol/Internet Protocol (TCP/IP). They may also use TELESCRIPT protocols developed by General Magic Corp. of Sunnyvale, Calif. Although the most common method by which individuals access the Internet is via a service provider's gateway, any computer having the necessary hardware and software can be connected directly to the Internet.

An email message comprises a header, which includes the sender's address (source address) and the recipient's address (destination address), and the body of the message, all encoded in accordance with these protocols. As noted above, the body of the message typically includes ASCII-encoded text and may also include a digitized image or audio attachment.

To retrieve email from a service provider, the subscriber uses a computer and a modem, under the control of software that is typically provided by the service provider, to call and communicate with the service provider's computer via the telephone system. When the service provider's computer answers, it typically queries the subscriber for a username and password. If the subscriber enters the correct username and password, the service provider's computer "logs in" the subscriber and allows the subscriber to perform various functions, including determining whether email messages intended for the subscriber have been received and stored and, if so, downloading the email messages to the subscriber's computer. When the subscriber is finished, the subscriber logs out and terminates the telephone call.

Software is known that causes a computer and modem to periodically, e.g., once every hour, call a service provider, log in, determine whether any email messages have been received and stored, download any such email messages, and then log out and hang up the call. The Mail Handling System (MHS), produced by Novell Corporation, is an example of such software that can be run on a Novell network server.

It would be desirable to provide a system for conveniently storing and playing back both voice and email messages received via the telephone system. These problems and deficiencies are clearly felt in the art and are solved by the present invention in the manner described below.

SUMMARY OF THE INVENTION

The present invention is an integrated answering machine system for recording both telephone and email messages. The system includes an integrated answering machine device and the method by which it receives and records messages.

The answering machine includes a telephone line interface, a modem, a processor and associated memory, recording means, a speaker, a display, and a keypad or other suitable input means. When the answering machine detects a ring signal on the telephone line to which it is connected, it answers the call. The answering machine plays an outgoing message for the caller to hear and records the caller's incoming voice message. Periodically or at predetermined times, the answering machine may check for email messages by calling a service provider. When the service provider answers the call, the answering machine logs in, downloads and stores at least a portion of email messages that have been received. For example, the answering machine may download only header information that indicates the identity of the sender. Alternatively to periodically calling the service provider, the answering machine may wait for the service provider to call. When the answering machine answers a call, before playing an outgoing message, it may read the telephone number of the calling party using the Calling Number Delivery (CND) service, often referred to as "Caller ID," that many telephone companies provide. If the telephone number is that of the service provider, the answering machine does not play an outgoing message but rather logs in to the service provider and downloads email messages or portions thereof. Alternatively to reading the calling party's

telephone number, the answering machine may determine if the calling party is the service provider by detecting a unique predetermined tone or sequence of tones, e.g., "touch-tone" DTMF tones, that the service provider may transmit.

The answering machine displays at least an indication that messages have been received, but preferably displays additional information. For example, it may display the number of calls and email messages received. It may also display the time and date of email and voice messages. It may also display the identities of email senders. Similarly, it may display the telephone numbers or corresponding names of callers who left voice messages, which it may obtain using the CND service or by decoding predetermined tones, e.g., DTMF tones, that identify the caller.

A user can view the display and review the messages. If the email and voice messages are identified individually on the display, the caller may select an individual message to review. Voice messages are played through the speaker, and email messages are provided on the display. If the entire email message has been stored, the body of the message is retrieved from memory and displayed. If only a portion of the selected email message, such as the header, has been stored, the answering machine calls the service provider and downloads the remaining portion of the message and displays it. At that time it may download any other messages that have been received. If a selected email message includes a voice attachment, the answering machine plays that attachment through the speaker as well as displays any text in the body of the message.

The system of the present invention allows a user to conveniently record and review both voice and email messages using an integrated answering machine connected to the user's telephone line.

The user may also compose either an email message or a voice message and send the message via the Internet to a remote email address. This composed message may be a reply to a previously received message.

In addition, the answering machine may include password protection. The user may be required to properly enter a password or code before the messages are displayed or played.

The answering machine may be accessed via a remote computer, such as a portable laptop computer. This remote computer may place a call to the answering machine via a data modem, and may provide DTMF or calling tones or modem data protocols that will provide commands to the answering machine. These commands may include commands that allow the remote user to forward messages, reply to messages, clear all messages, and record a new outgoing message. The answering machine may send and receive virtually any type of data, binary, ASCII, voice, sound and graphics.

The answering machine may also perform the above functions on a PBX telephone system. Each user on the PBX system may perform all functions described above from the user's telephone extension. The answering machine preferably sends and receives email securely for each PBX user.

An exemplary sequence of events that reveals the convenience and ease-of-use of the present invention is as follows: A user may look at the answering machine and visually determine whether messages have arrived. The user can listen to all voice messages and display all text messages. For each Internet message, the user can immediately reply by pressing a "REPLY" key or by typing a message and pressing the "REPLY" key.

The answering machine may support all common email protocols, including the TELESCRIPT protocol.

The foregoing, together with other features and advantages of the present invention, will become more apparent when referring to the following specification, claims, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, reference is now made to the following detailed description of the embodiments illustrated in the accompanying drawings, wherein:

FIG. **1** is a schematic illustration of an Internet answering machine;

FIGS. **2-1** and **2-2** are a flow diagram illustrating a method for receiving and storing messages in the answering machine;

FIG. **3** is a flow diagram illustrating an alternate method for receiving and storing messages in the answering machine;

FIG. **4** illustrates the display of the answering machine;

FIG. **5** is a flow diagram illustrating a method for retrieving the remaining portions of messages; and

FIG. **6** is a flow diagram illustrating a method for composing and transmitting messages using the answering machine.

DESCRIPTION OF PREFERRED EMBODIMENTS

As illustrated in FIG. **1**, an Internet answering machine is connectable to a telephone line **5** and comprises a processor **10**, memory **12**, a modem **14**, a display **16**, a keypad **18**, and a data access arrangement (DAA) **20**, an analog-to-digital (A/D) converter **22**, a digital-to-analog (D/A) converter **24** and a speaker **26**. As described below in further detail, the answering machine allows a user to review both voice and email messages that are received via telephone line **5**. Incoming email messages are stored directly in memory **12** under the control of processor **10**. Incoming voice messages are digitized by A/D converter **22** and stored in memory **12** under the control of processor **10**. Processor **10** displays information on display **16** to notify the user of messages that have been received. The user may enter commands on keypad **18** to cause processor **10** to retrieve email and voice messages from memory **12** and display the email messages on display **16** and play the voice messages through speaker **26** via D/A converter **24**.

Processor **10** is preferably an economical 8-bit microprocessor or microcontroller, such as an Intel 80186 or NEC V-25. Nevertheless, any processor or combination of processors or equivalent programmable control logic capable of being programmed to perform the method of the present invention, as described below, is suitable.

Memory **12** stores suitable program instructions for operating processor **10** in accordance with the method of the present invention described below. Memory **12** also preferably stores incoming voice and email message data in accordance with the method of the present invention described below. Nevertheless, a separate memory may be provided for recording the message data. Memory **12** preferably includes non-volatile Random Access Memory (RAM) for storing program instructions, and any suitable combination of static RAM (SRAM) memory, dynamic RAM (DRAM) memory, flash memory, credit-card memory, or disk memory for storing message data. Although the preferred means for recording message data is memory **12**, any suitable recording means may be used. For example,

voice message data is particularly suitable for recording on magnetic tape cassettes because that medium has a large capacity and is economical in comparison to solid-state memory. In such an embodiment, a suitable tape recording mechanism would be provided.

Modem **14** preferably has an operating speed of 14.4 kbps or greater and preferably supports ITU V.34, V.32bis, V.32, V.22bis, V.21 and Bell 212 data communication standards.

Display **16** is preferably a small, economical LCD display that displays several lines of text to enable a user to read email messages, as described below. Nevertheless, any suitable, compact display may be used.

As described below, keypad **18** preferably has dedicated keys that initiate functions such as displaying email messages, scrolling through lines on the display, and deleting email messages as well as functions commonly performed by conventional telephone answering machines, such as recording outgoing voice messages, playing stored (incoming) voice messages and fast-forwarding through incoming voice messages. Nevertheless, a compact, economical typewriter-style ("QWERTY") keyboard, such as the type having membrane switches, is also suitable. As described below, a full "QWERTY" keyboard would allow a user to compose and send email messages as well as receive them.

DAA **20** provides the electrical interface between modem **14** and telephone line **5**. Telephone line **5** is plugged into the RJ-11 jack **28** of DAA **20**. In the United States DAA **20** will conform to the requirements of Federal Communications Commission (FCC) Part 68. Suitable DAAs are commercially available from numerous manufacturers.

A serial port **30** may be provided to facilitate interfacing an external "QWERTY" keyboard **32**. A parallel port **34** may also be provided to facilitate interfacing a printer **36**. As noted above, a full "QWERTY" keyboard enables a user to compose and send email messages as well as receive them. Printer **36** would allow a user to print received email messages.

A method by which the answering machine receives messages and the user reviews them is illustrated in FIG. **2**. Persons of skill in the art will readily be capable of writing suitable software and/or firmware to implement this method. At step **38** processor **10** determines whether DAA **14** has received a ring signal on telephone line **5**. If a ring signal is received, DAA **14** answers the call at step **40** by placing telephone line **5** in the off-hook state. At step **42** processor **10** uses Calling Number Delivery (CND) circuit **44** to attempt to read the telephone number associated with the caller. In areas in which the local telephone company provides CND service, the number is encoded in the ring signal on the first ring. Alternatively, in other embodiments the calling number may be decoded from DTMF tones or calling tones that the caller provides. Circuit **44** decodes the number and makes it available to processor **10**. At step **46** processor **10** compares the number to a pre-stored number, which the user may enter into the system via keypad **18** when initially configuring or setting-up the system. (The configuring process may be controlled by suitable set-up software that persons of skill in the art will readily be capable of producing to supplement and facilitate the present method.) The pre-stored number should be that of the user's on-line service provider. Those of skill in the art will appreciate that processor **10** may compare the number to several pre-stored numbers if the user subscribes to several on-line service providers. If the number is not that of the user's on-line service provider, or if CND circuit **44** was unable to read a telephone number in the ring signal, at step **48** processor **10** plays a pre-recorded outgoing message. Processor **10** retrieves the message from memory **12** and provides it to D/A converter **24**. The resulting outgoing audio message is transmitted to telephone line **5** via DAA **20**. In response to the outgoing message, the caller may leave a voice message. A/D converter **22** receives the incoming audio message from telephone line **5** via DAA **20**. At step **50** processor **10** stores the resulting message data in memory **12**. At step **52** processor **10** updates display **16** to reflect the incoming voice message, as described below. (The term "audio message" is sometimes used herein synonymously with the term "voice message"; while a caller typically speaks into the telephone handset to leave a message, the caller may, of course, play music or provide any other type of audible signal.) At step **55** processor **10** determines whether an option has been selected that activates the recipient's pager (not shown) to provide notification that a message has been received. The user may select this paging option using the set-up software. If the option is not selected, processor **10** then returns to step **38** to await either another ring signal or a message selection by the user, as described below. If the option is selected, processor **10** initiates a telephone call to a predetermined pager number that the user specifies at set-up time. At step **59** processor **10** sends at least an indication to the pager that a message has been received. If the pager has text display capability, however, processor **10** preferably sends the caller's telephone number. Processor **10** then returns to step **38**.

Using the set-up software, the user may configure the above-described paging function to occur only upon predetermined events. For example, the answering machine may page the user upon detecting a predetermined telephone number using CND circuit **44**. Also, the answering machine may page the user only if, upon examining all of the header information in the user's email "box", it finds information that matches predetermined information the user specified at set-up time. Thus, for example, the answering machine can initiate a page if it finds an email message having a fax attachment. It may also initiate a page, for example, if the sender places a predetermined identifier or symbol within a predetermined field in the header.

If, at step **46**, processor **10** determines that the caller's telephone number is a pre-stored number of an on-line service provider, processor **10** establishes data communication with the on-line service provider via modem **14**. (As used in this context, the term "on-line" service provider refers, of course, to the service provider's computer and its associated telecommunications equipment, rather than the business entity.) At step **54** processor **10** downloads email messages from the on-line service provider. The on-line service provider may call the answering machine in this manner either periodically, e.g., once per hour, at predetermined times of day, or whenever it receives an email message addressed to the user. The on-line service provider may receive these email messages via the Internet or locally from other subscribers to the on-line service. Because the user is actually downloading copies of the email messages and because on-line service providers typically do not automatically delete messages that a user has downloaded, at step **56** processor **10** may cause the on-line service provider to delete the messages. Deleting messages in this manner is not necessary, but it is desirable to prevent large numbers of email messages from accumulating because on-line service providers may charge users for their storage. At step **58** processor **10** terminates communication with the on-line service provider and causes modem **14** to hang up

the call. At step **60** processor **10** updates display **16** to reflect the received email messages, as described below. At step **55** processor **10** determines whether the paging option described above has been selected. If the option is not selected, processor **10** then returns to step **38** to await either another ring signal or a message selection by the user, as described below. If the option is selected, processor **10** initiates a telephone call to the predetermined pager number and sends at least an indication to the pager that a message has been received. If the pager has text display capability, however, processor **10** preferably sends a portion of the received message information, such as the header of each email message. Processor **10** then returns to step **38** to await either another ring signal or a message selection by the user.

As described below in further detail, the user may review any message indicated on display **16**. At step **62** processor **10** determines if the user selected a message for review. If the user selects a message for review, at step **64** processor **10** determines whether the message is an email message or a voice message. Each message stored in memory **12** has an associated tag stored with it that includes an index number and a type. The index number corresponds to the position of the message on display **16**, as described in further detail below. The type indicates whether the message is email or voice. At step **64** processor **10** examines the type. If the selected message is email, at step **66** processor **10** retrieves the message data from memory **12** and displays it for the user on display **16**. The displayed information -includes the header and any accompanying routing and forwarding information included as part of the received message, as is typical in conventional email display software. If the email message includes a voice attachment, processor **10** provides the attachment data to D/A converter **24**. The resulting audio attachment is played for the user via speaker **26**. If printer **36** is connected, processor **10** may also provide the message data to parallel port **34** for printing. Alternatively, processor **10** may defer printing until such time as the user enters a print command (not shown) on keypad **18**. If the selected message is voice, at step **68** processor **10** retrieves the message data from memory **12** and provides it to D/A converter **24**. The resulting message is played for the user via speaker **26**. Alternatively, the user may enter a "reply" command on keypad **18**, preferably by pressing a dedicated "REPLY" button (not shown). The user may compose text for the reply using keypad **18** or external "QWERTY" keyboard **32**. The user may include voice in the reply by speaking into a microphone (not shown). Processor **10** may obtain the email address of the intended recipient from the header of the received message, package the reply into the proper email format, and cause it to be transmitted back to the sender of the original message. Processor **10** then returns to step **38** to await another ring signal or another message selection by the user.

It should be noted that, although steps **62–68** are illustrated in FIG. **2** as performed only if the result of step **38** is negative, persons of skill in the art will appreciate that, using suitable well-known multitasking programming techniques, the answering machine may retrieve messages from the on-line service provider while the user is reviewing messages. Similarly, although FIG. **2** illustrates a sequential flow to the method for purposes of clarity, those of skill in the art will appreciate that an interrupt-driven approach may be equally suitable. The same should be noted with respect to the method illustrated in FIG. **3**.

Although a user may, as described above, select and review messages via keypad **18** and speaker **26**, a user may also review voice messages and voice attachments to email messages via a remote telephone. The user can call the answering machine and enter commands on the telephone keypad to review stored messages. Such methods are well-known in conventional answering machines and not described in further detail herein.

Alternatively to the above-described method, in which the on-line service provider calls the answering machine to deliver email messages, the answering machine may at predetermined times of day or periodically, e.g., every hour, call the on-line service provider to poll whether any email messages addressed to the user have been received and, if so, download and store the email data. Persons of skill in the art will readily be capable of writing suitable software to implement the method illustrated in FIG. **3**. At step **70** processor **10** resets or initializes a timer that determines the period that processor **10** waits between successive pollings of the on-line service provider. The timer begins to count and runs continuously until reset. The user may pre-store the desired period, such as one hour, during the initial system set-up noted above. At step **72** processor **10** polls the timer to determine whether the pre-stored period has elapsed. If the period has elapsed, at step **74** processor **10** initiates a telephone call to the on-line service provider via modem **14** and DAA **20**. When the on-line service provider answers, processor **10** establishes communication and logs in at step **76**. At step **78** processor **10** queries the on-line service provider whether any email messages addressed to the user have been received. If email messages have been received, processor **10** downloads the messages and stores them in memory **12** at step **80**, in the same manner as described above with respect to step **54** of FIG. **2**. At step **82** processor **10** may deleted the downloaded messages as described above with respect to step **56** of FIG. **2**. At step **84** processor **10** logs out, terminates communication and hangs up the call. If, at step **78**, processor **10** determines that no email messages were received, processor **10** proceeds directly to step **84**. Processor **10** then returns to step **70** and resets the timer.

If, at step **72**, processor **10** determines that the pre-set time has not elapsed, the user may select a message. At step **86** processor **10** determines if the user selected a message for review. If the user selects a message for review, at step **88** processor **10** determines whether the message is an email message or a voice message. If the selected message is email, at step **90** processor **10** retrieves the message data from memory **12** and displays it for the user on display **16** and, if the email message includes a voice attachment, plays the attachment at step **92** as described above with respect to step **68** of FIG. **2**. As similarly described above, if printer **36** is connected, processor **10** may also cause it to print the message. Processor **10** then returns to step **72** until either the pre-set time period elapses or the user selects another message.

As noted above, the user may select to review any of the voice and email messages that display **16** indicates have been received. A typical output of display **16** is illustrated in FIG. **4**. Display **16** may display any number of parameters that reflect or correspond to the message data that has been stored in memory **12**. For example, the parameters displayed on display **16** may consist of only an indication that at least one message has been received. It may thus display an alphanumeric message, such as "MESSAGES HAVE BEEN RECEIVED." More economically, in such an embodiment, display **16** would be a single LED that would be blink if messages have been received. Alternatively, for example, the parameters displayed on display **16** may include an indication of the number of messages received. It may thus

display the alphanumeric message "3 MESSAGES HAVE BEEN RECEIVED", as shown at the top of the display output illustrated in FIG. **4**. In an embodiment in which the displayed parameters consist only of the number of messages received, display **16** would more economically be a single 7-segment LED numeric display.

Alternatively, or in addition to these parameters, display **16** may provide other parameters, such as information identifying the sender, whether the message is email or voice mail, and the time and date the message was received. If the message was email, display **16** may also display the subject of the message, which is typically included in an email header.

As illustrated in FIG. **4**, the output of display **16** preferably includes a line of alphanumeric information for each message that has been received. Processor **10** may display these lines in the temporal order the corresponding messages were received or in any other order selected by the user during system set-up, such as alphabetic order by the sender's name or by type of message. Such display techniques are well-known in email software and not described further herein. The order in which the lines are displayed may correspond to the index number, described above, that is stored with the message in memory **12**.

The display output is divided into columns labeled "FROM", "TYPE", "SUBJECT", "DATE" and "TIME". The exemplary output illustrated in FIG. **3** indicates the three messages that have been received. The "FROM" column relating to the first exemplary message (the line immediately below the column labels) indicates that it was received from a caller at telephone number "619-555-1234". As noted above, processor **10** obtains this number using CND circuit **44**. Processor **10** stores the number in memory **12** along with the message at the time it is received, as described above. As known in the art, a telephone number obtained using CND may be converted to an mnemonic tag, such as the caller's name, and the tag can be displayed in place of or in addition to the number.

Memory **12** may include a pre-stored correspondence or "telephone directory" between telephone numbers and the names of individuals or other identifying information. The user may store this telephone directory information during system set-up. The user may also choose to automatically store email addresses of some or all senders into the telephone directory. The set-up software can configure the answering machine to automatically strip the sender's email address from each message it receives and store that address in the telephone directory along with the sender's name.

If CND is not available or CND circuit **44** cannot read a telephone number, the indication "<UNKNOWN>" may be displayed, as shown in the line corresponding to the second exemplary message. The "TYPE" column indicates that the first message is voice. The "SUBJECT" column indicates "<NONE>" because such information relates only to email messages. The "DATE" and "TIME" columns indicate the date and time the message was received. Processor **10** includes an internal clock to maintain the current date and time, which the user can set during system set-up. The "FROM" column relating to the third exemplary message indicates that it was received from a sender at email address "ROBIN@CR.COM". As noted above, processor **10** obtains the sender's email address from the message header, which is stored in memory **12** with the other information relating to that message. In a manner similar to the above-noted conversion of a telephone number to a mnemonic tag, such as the caller's name, processor **10** can use a directory pre-stored in memory **12** to convert the email address into a corresponding tag and display the tag in place of or in addition to the email address. The "TYPE" column indicates that the third message is email. Processor **10** obtains the text shown in the "SUBJECT" column from the message header. The "DATE" and "TIME" columns indicate that the message was received after the first message. Because the number of email messages that have been received may exceed the number of lines simultaneously displayable on display **16**, keypad **18** preferably allows a user to enter commands for scrolling through displayed lines. Other display manipulations and customizations commonly used in email software may also be included. Such display techniques are well-understood in the art and not described herein.

Although the output illustrated in FIG. **4** is preferred, it should be noted that the displayed parameters corresponding to email messages may include not only information obtained from the header, but the entire header or even the entire email message. Email messages or portions thereof may be appended to the display output in the order the email messages are received. The user may use keypad **18** to scroll through the display output.

At steps **54** and **80** of FIGS. **2** and **3**, respectively, either the entire email message or only a portion of it may be downloaded and stored. For example, only the header may be downloaded and stored. As illustrated in FIG. **5**, the remaining portions of the message may be retrieved only if the user chooses to read the message. This alternative embodiment minimizes memory requirements and minimizes the time required for each initial telephone transaction with the on-line service. In this embodiment steps **56** and **82** of FIGS. **2** and **3**, respectively, in which the downloaded message is deleted from the service provider's computer, would not be performed. In this embodiment the following method, illustrated in FIG. **5**, would be included in steps **66** and **90** of FIGS. **2** and **3**, respectively, in which the selected message is retrieved from memory **12** and displayed.

At step **94** processor **10** initiates a telephone call to the on-line service provider via modem **14** and DAA **20**. When the on-line service provider answers, processor **10** establishes communication and logs in at step **96**. At step **98** processor **10** downloads the messages and stores them in memory **12**. Although portions of the messages, such as the headers or portions of the headers, are already stored in memory **12**, processor **10** may nonetheless download the entire message. Alternatively, only the portions of the message that have not been previously downloaded are downloaded at this time. At step **100** processor **10** may deleted the downloaded messages. At step **102** processor **10** logs out, terminates communication and hangs up the call. Processor **10** then displays the downloaded email messages, including playing audio attachments, as described above with respect to steps **66** and **90** of FIGS. **2** and **3**.

It is preferred, at step **98**, that processor **10** download all messages that have been received, i.e., including the non-selected messages, or at least a number of the non-selected messages, since it is likely that the user will wish to subsequently read additional messages. Nevertheless, it is suitable for processor **10** to log out, hang up, wait until the user selects another message, establish another telephone connection, log back in, and download the next selected message.

When a selected message is displayed, processor **10** preferably replaces the message summary output illustrated in FIG. **4** with the selected email message. Alternatively, if

the user selects an option during set-up, processor **10** may display both the message and message summary in a "split-screen" mode. Because an email message is likely to have a length greater than the capacity of display **16**, keypad **18** preferably allows a user to enter commands for scrolling through the message and performing other text manipulation functions commonly provided in conventional email systems. When the user is finished reviewing the displayed email messages, the user may enter a command on keypad **18** to return to the message summary display. Alternatively, processor **10** may return to the message summary display after a pre-set amount of time, such as 1 minute, elapses during which time the user does not scroll though the message or enter any other commands via keypad **18**.

The answering machine also has a robust capacity to send both email and voice mail messages. A method by which the answering machine can be used to compose and send such messages is illustrated in FIG. **6**. At step **104** a user may use keypad **18** or external "QWERTY" keyboard **32** to compose text messages or use a microphone (not shown) to compose voice messages. At step **106** the user selects a destination address. The user may do so by entering the destination email address using keypad **18** or external "QWERTY" keyboard **32**, or by simply pressing the "REPLY" key (not shown) to send the newly composed message to the previous sender. The user may select the destination address by using keypad **18** to choose an entry in the telephone directory stored in memory **12**. As described above, the directory contain the name of the destination user as well as the corresponding destination on-line email address. A user may add, delete or modify entries in the directory using keypad **18**. At step **108** processor **10** sends the message via modem **14**.

Obviously, other embodiments and modifications of the present invention will occur readily to those of ordinary skill in the art in view of these teachings. Therefore, this invention is to be limited only by the following claims, which include all such other embodiments and modifications when viewed in conjunction with the above specification and accompanying drawings.

What is claimed is:

1. A method for receiving messages using an integrated answering machine, comprising:

answering a telephone call in response to a ring signal on a telephone line at said answering machine;

providing an indication to a caller via said telephone line that said call has been answered;

receiving a voice message from said caller via said telephone line;

storing at least a portion of said voice message in said answering machine;

said answering machine automatically querying a remote computer periodically to determine whether any e-mail messages are stored in the remote computer, including determining whether a telephone number associated with an incoming telephone call is a predetermined service provider number; and

providing an indication as to whether any e-mail messages are stored in said remote computer.

2. The method defined in claim **1**, further including said answering machine initiating a telephone connection with said remote computer and downloading copies of e-mail messages stored in said remote computer into said answering machine.

3. An integrated answering machine for receiving telephone messages via a telephone line and e-mail messages from a remote computer also via the telephone line, the answering machine comprising:

a telephone line interface connectable to the telephone line;

a modem coupled to the telephone line interface;

a processor configured

for controlling the receipt and recording of telephone messages,

for automatically periodically establishing a connection with a remote computer via the modem and the telephone line and independently querying the remote computer to determine whether any e-mail messages are stored in the remote computer, and

for determining the telephone number associated with an incoming telephone call, and if said telephone number is a predetermined service provider number, downloading copies of e-mail messages stored in said remote computer,

the processor being coupled to the telephone line interface and to the modem;

a display for indicating the results of the query of the remote computer; and

a memory coupled to the processor for storing at least a portion of the telephone messages.

4. An integrated answering machine for receiving telephone messages via a telephone line and e-mail messages from a remote computer also via the telephone line, the answering machine comprising:

a telephone line interface connectable to the telephone line;

a modem coupled to the telephone line interface;

a processor configured

for controlling the receipt, recording and playback of telephone messages,

for automatically determining the telephone number associated with an incoming telephone call, and if said telephone number is a predetermined service provider number, automatically downloading copies of e-mail messages stored in said remote computer, and

for controlling the receipt, storing and display of at least a portion of e-mail messages received via said telephone line,

the processor being coupled to the telephone line interface and to the modem; and

a memory coupled to the processor for storing at least a portion of the e-mail messages.

5. The integrated answering machine defined in claim **4**, wherein said processor further includes means for establishing a telephone connection with said remote computer via said modem and said telephone line, and for downloading copies of e-mail messages stored in said remote computer.

* * * * *

US006714637B1

(12) **United States Patent**
Kredo

(10) **Patent No.: US 6,714,637 B1**
(45) **Date of Patent: Mar. 30, 2004**

(54) **CUSTOMER PROGRAMMABLE CALLER ID ALERTING INDICATOR**

(75) Inventor: **Thomas J. Kredo**, Rochester, NY (US)

(73) Assignee: **Nortel Networks Limited**, Quebec (CA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/421,024**

(22) Filed: **Oct. 19, 1999**

(51) **Int. Cl.**[7] **H04M 3/42**

(52) **U.S. Cl.** **379/215.01**; 379/88.19; 379/142.08

(58) **Field of Search** 379/88.12, 88.16, 379/88.19, 88.2, 88.21, 88.22, 88.23, 142.01, 142.08, 373.02, 374.02, 215.01

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,873,719	A *	10/1989	Reese	379/215
5,289,530	A *	2/1994	Reese	379/88
5,309,512	A	5/1994	Blackmon et al.	
5,526,406	A	6/1996	Luneau	
5,533,102	A	7/1996	Robinson et al.	
5,550,908	A	8/1996	Cai et al.	
5,619,561	A *	4/1997	Reese	379/142
5,636,269	A *	6/1997	Eisdorfer	348/14.01
5,651,054	A *	7/1997	Dunn et al.	39/88.11
5,805,587	A	9/1998	Norris et al.	
5,805,677	A	9/1998	Ferry et al.	
5,809,128	A	9/1998	McMullin	
5,825,867	A	10/1998	Epler et al.	
5,828,742	A	10/1998	Khalid et al.	
5,832,060	A *	11/1998	Cortlett et al.	379/88
5,836,009	A	11/1998	Diamond et al.	
5,946,381	A *	8/1999	Danne et al.	379/142.07
5,999,613	A *	12/1999	Nabkel et al.	379/142.04
6,028,922	A *	2/2000	Deutsch et al.	379/211
6,078,581	A *	6/2000	Shtivelman et al.	370/352
6,104,800	A *	8/2000	Benson	379/215.01
6,219,414	B1 *	4/2001	Maciejewski et al.	379/215
6,253,075	B1 *	6/2001	Beghtol et al.	455/415
6,269,159	B1 *	7/2001	Cannon et al.	379/202.01
6,308,221	B1 *	10/2001	Perlman et al.	370/238
6,317,488	B1 *	11/2001	DePond et al.	379/93.35
6,339,639	B1 *	1/2002	Henderson	379/142.08
6,343,121	B1 *	1/2002	Infosino	379/215.01
6,347,136	B1 *	2/2002	Horan	379/142.01
6,389,124	B1 *	5/2002	Schnarel et al.	379/142.01
6,393,106	B1 *	5/2002	Cannon et al.	379/142.08
6,404,858	B1 *	6/2002	Farris et al.	379/201.02
6,445,694	B1 *	9/2002	Swartz	370/352
2001/0043691	A1 *	11/2001	Bull et al.	379/142.08

FOREIGN PATENT DOCUMENTS

JP	0048749	* 5/1981	379/215
JP	0250256	* 10/1988	379/215
JP	0250257	* 10/1988	379/215
JP	0022162	* 1/1989	379/215
JP	0060137	* 3/1989	379/68
JP	0137859	* 5/1989	379/68
JP	0232862	* 9/1989	379/68
JP	0248747	* 10/1989	379/215
JP	0253389	* 10/1989	379/215
JP	0256358	* 10/1990	379/215
SU	0474115	* 6/1975	379/215

* cited by examiner

Primary Examiner—Scott L. Weaver
(74) *Attorney, Agent, or Firm*—Hunton & Williams LLP

(57) **ABSTRACT**

An audio alerting announcement signals a subscriber **80** during an ongoing call with a distinctive tone to indicate the identity of another party who is trying to call the subscriber. A telephony call-waiting subscriber customizes Call Waiting indicators in order to give immediate recognition of caller or caller classification via audio signaling. The caller or caller classification is based on the calling party's Line Number ID. This capability is not restricted to the public switched telephone network (PSTN) environment, but will function equally well in a voice-over-IP telephony network as well, on a network such as the World Wide Web, or will function in a hybrid system containing elements of both PSTN and voice-over-IP networks.

19 Claims, 3 Drawing Sheets

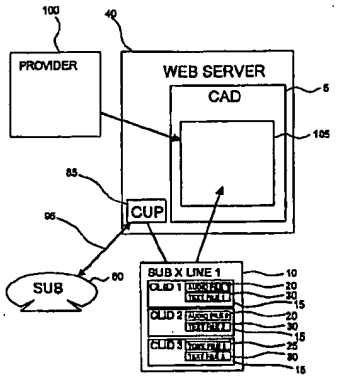


FIG. 1

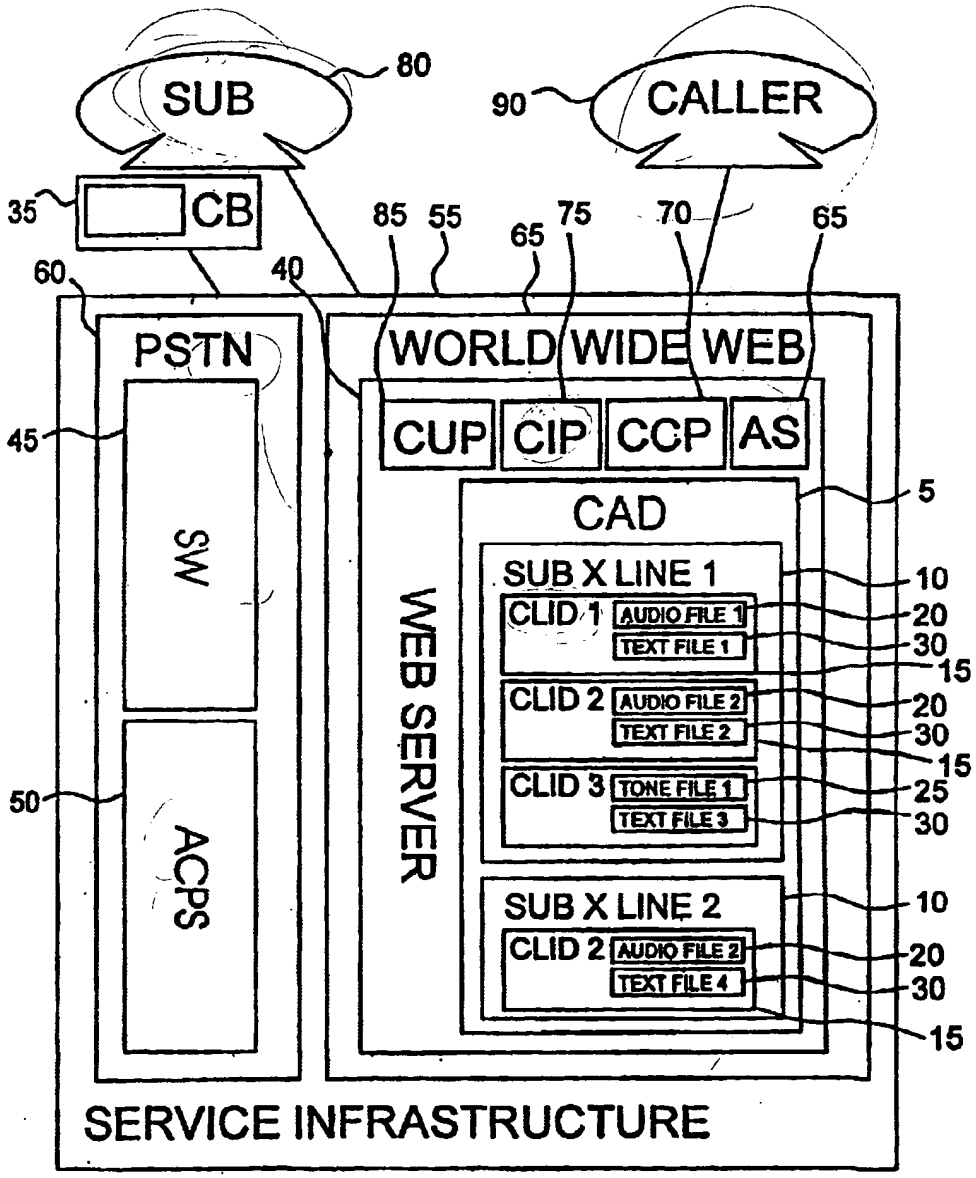

SUB
80
90
CALLER
35
CB
85
55
65
75
70
65
60
40
PSTN
WORLD WIDE WEB
45
CUP
CIP
CCP
AS
5
CAD
SW
SUB X LINE 1
10
CLID 1
AUDIO FILE 1
20
TEXT FILE 1
30
15
CLID 2
AUDIO FILE 2
20
TEXT FILE 2
30
15
CLID 3
TONE FILE 1
25
TEXT FILE 3
30
WEB SERVER
50
ACPS
SUB X LINE 2
10
CLID 2
AUDIO FILE 2
20
TEXT FILE 4
30
15
SERVICE INFRASTRUCTURE

FIG. 2

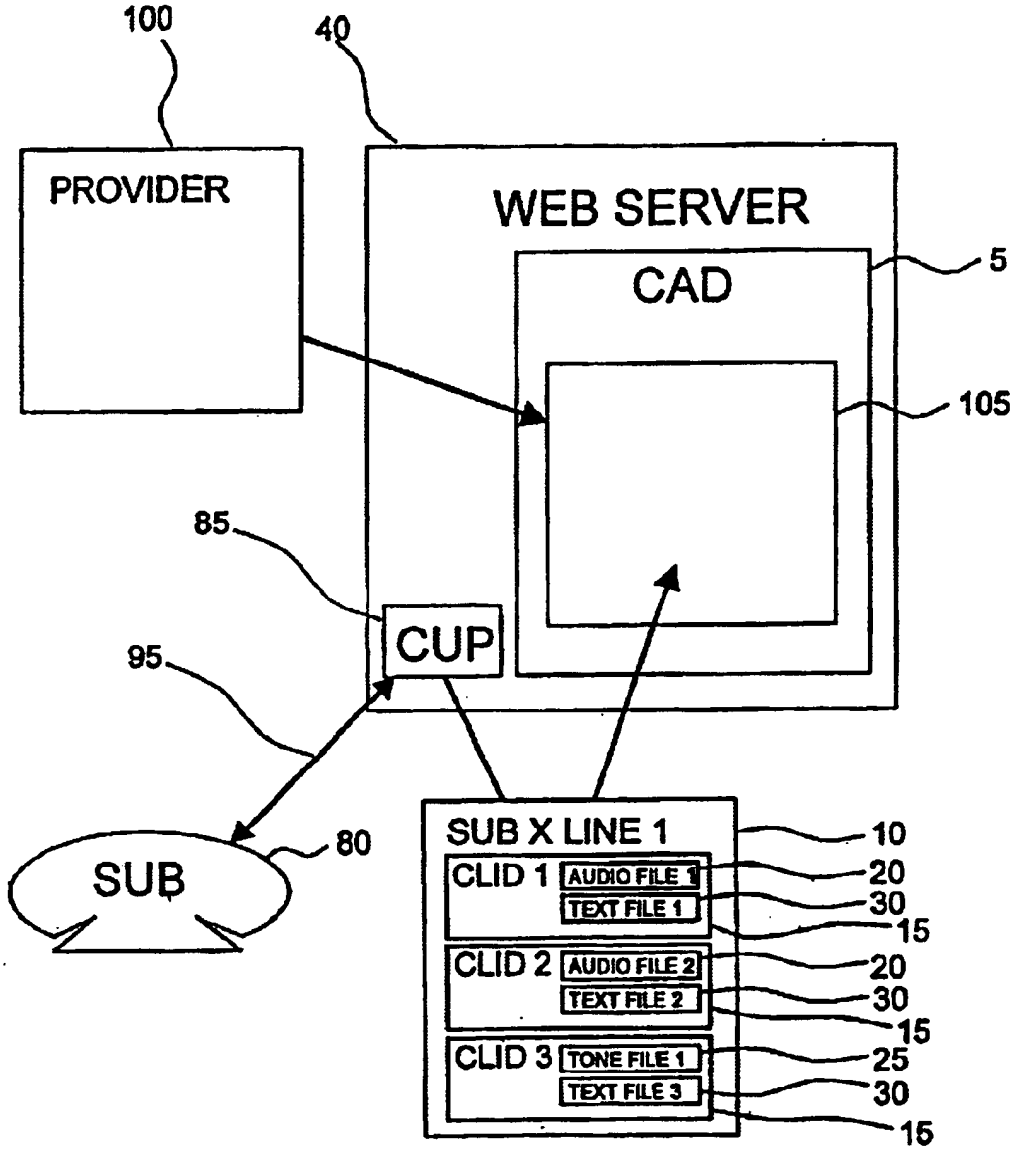
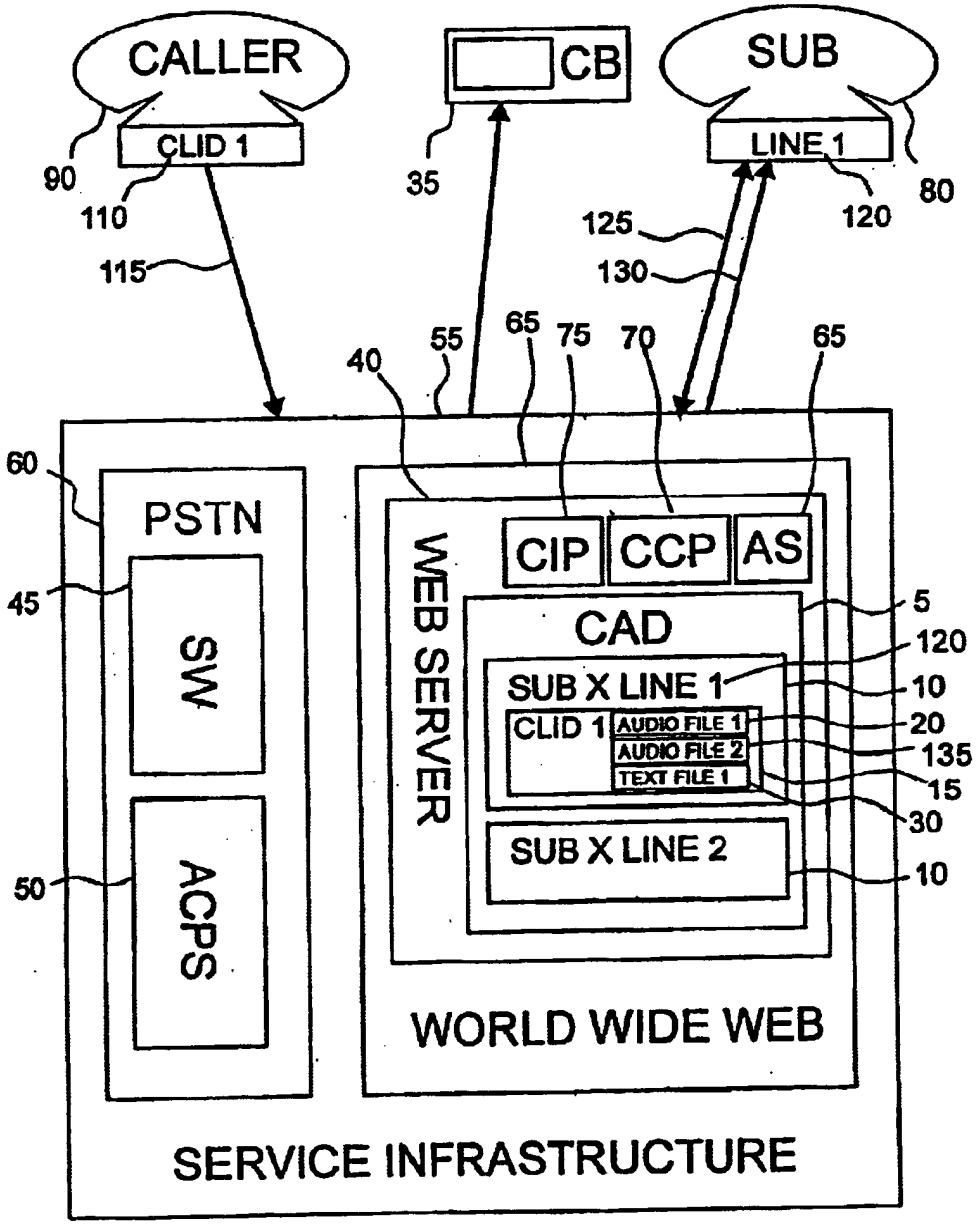

100
40
PROVIDER
WEB SERVER
CAD
5
105
85
CUP
95
SUB
80
SUB X LINE 1
10
CLID 1
AUDIO FILE 1
20
TEXT FILE 1
30
15
CLID 2
AUDIO FILE 2
20
TEXT FILE 2
30
15
CLID 3
TONE FILE 1
25
TEXT FILE 3
30
15

FIG. 3


CALLER
CLID 1
CB
SUB
LINE 1
90
110
115
35
125
130
120
80
40
55
65
75
70
65
60
PSTN
45
SW
50
ACPS
WEB SERVER
CIP
CCP
AS
CAD
SUB X LINE 1
CLID 1
AUDIO FILE 1
AUDIO FILE 2
TEXT FILE 1
SUB X LINE 2
5
120
10
20
135
15
30
10
WORLD WIDE WEB
SERVICE INFRASTRUCTURE

CUSTOMER PROGRAMMABLE CALLER ID ALERTING INDICATOR

BACKGROUND OF INVENTION

The invention relates generally to telecommunications services, and more specifically to the provision of caller identification information to a called telecommunications service subscriber at a time when the called subscriber is already occupied with a prior call; this type of service is generally termed Caller ID Call Waiting.

1. Definitions

'Line' refers either to a telephone line, to a Web address, or to any other type of communication channel which provides for voice connection to a subscriber in control of such a line, address or channel.

'Phone number' refers to an identifying text of character codes used to specify uniquely a line as defined above. The choice of character codes to be used is in part dependent on restrictions required for the type of communication channel to which the line belongs; in the Public Switched Telephone Network (PSTN), only numbers or their dialing equivalents in telephone number format are allowable, while on the World Wide Web, any string of displayable characters which can be mapped to an Internet communication channel is usable.

2. Discussion of Prior Art

Several prior art references address the signaling of a called party with information about the calling party, but fail to combine signaling features in the unique range of contexts and manners performed in the proposed invention.

U.S. Pat. No. 5,636,269 to Eisdorfer describes collecting information about the caller, such as the caller's identity or the importance of the call, and provides a distinctive call waiting signal which may take the form of an audio announcement. Eisdorfer does not, however, provide for any application of the art in a voice-over-IP network, nor does it explicitly spell out the use of a database to map caller identification to a desired course of action, nor does it provide for cut-through of real-time one-way signaling directly from the caller.

U.S. Pat. No. 5,828,742 to Khalid et al. creates a pass-code-based distinction among callers, manifested only through distinctive ringing. It offers no voice-based customization of called party notifications.

U.S. Pat. No. 5,809,128 to McMullin notifies an on-line computer user of the presence of an incoming telephone call, links the computer to the incoming call over the Internet, and provides for completion of the call using the computer's Internet connection. McMullin does not, however, provide for one-way cut-through of real-time signaling directly from the caller as a substitute for the ring signal.

U.S. Pat. No. 5,526,406 to Luneau provides for presentation of calling party announcement to the called party, but makes no provision for such presentation in a Call Waiting scenario.

U.S. Pat. No. 5,836,009 to Diamond et al. describes a method of signal attenuation during Call Waiting signaling, but offers no customization of the Call Waiting signaling itself.

U.S. Pat. No. 5,825,867 to Epler et al. describes methods of signaling during Call Waiting, but fails to address its operation on the World Wide Web.

SUMMARY OF INVENTION

An audio alerting announcement signals a called party during another ongoing call. The invention allows a telephony call-waiting subscriber to customize Call Waiting indicators in order to give immediate recognition of caller or caller classification via audio signaling. The caller or caller classification is based on the calling party's Line Number ID. This capability is not restricted to the public switched telephone network (PSTN) environment, but will function equally well in a voice-over-IP telephony network as well, on a network such as the World Wide Web, or will function in a-hybrid system containing elements of both PSTN and voice-over-IP networks.

DESCRIPTION OF DRAWINGS

FIG. 1 shows an overview of all components of the invention, including some detail in the Caller Alert Database.

FIG. 2 shows an overview of the process of establishment and maintenance of subscriber Caller Alert Database information, as specified in the invention.

FIG. 3 shows an overview of the process of handling a call requiring use of caller alert processing as specified in the invention.

DETAILED DESCRIPTION OF INVENTION

Refer to FIG. 1. A subscriber **80** is connected to a caller **90** by a service infrastructure **55** that includes in any operable combination a public switched telephone network (PSTN) **60**, a switch **45** and its internal computing subsystems, a computer system **50** adjunct to a switch **45** (adjunct call processing system, ACPS), and an Internet and World Wide Web **100**. Each switch is controlled by an Automatic Call Processing System (ACPS) **50**. Calls from the caller **90** to the subscriber may occur over only the PSTN **60** or over the WWW **100** or over a combination of both using Voice over Internet Protocol.

On the WWW **100** there is a web server **40** that includes a computer program that provides a customer with Customer Programmable Caller ID Alerting Indicator or CIAI. The CIAI includes a Customer Alert Database **5** with supporting access software. For each subscribed line **10** of each CIAI subscriber **80** the database **5** includes a list of Calling Line ID phone numbers **15**, each with associated audio files **20** or tones **25**, and corresponding text **30** for display to CIAI subscriber **80** on a caller ID box **35** or other text display device associated with line **10** of CIAI subscriber **80**. Customer Alert Database **5** is shown on a Web server **40**, but may also reside on a telephony switch **45** with its internal computing subsystems, or on a database computer system **50** adjunct with a Web server **40** or a switch **45**.

The web server **40** includes a resident call control processing software program **70**. However, software program **70** may reside in either a telephone switching system itself **45** or in a call-processing system **50** adjunct to switch **45**. Program **70** conducts the call-control coordination necessary to activate Caller ID Program **75**, plays selected audio files and tones **20, 25** and displays selected text files **30** to Caller ID Box **35** for use by subscriber **80**.

Caller ID software program **75** is also resident in web server **40**. However, software program **70** may reside in either a telephone switching system **45** or in a call-processing system **50** adjunct to switch **45**. Program **75** looks up a phone number or line identifier **10** in customer alert database **5**, selects corresponding audio and text files **20, 25, 30** and feeds audio and text files **20, 25, 30** to call control program **70**.

Customer Update software program **85** is resident in web server **40**. However, software program **70** may reside in

either a telephone switching system **45** or in a call-processing system **50** adjunct to switch **45**. Program **85** conducts a dialog with any subscriber **80** allowing subscriber **80** to access database **5** to initiate, terminate or modify the use of any CLID information **15** for any subscribed line **10** for subscriber **80**, including the recording, alteration or deleting of any audio and/or text files **20, 25, 30** stored in caller information record **15** for subscriber line **10**.

Audio subsystem **65** is invoked by call control program **70** and plays a tone or audio file **20, 25** on a communication line for a subscriber. Refer to FIG. **3**; audio subsystem **65** may also play an audio file **135** for a caller **90**.

OPERATION OF INVENTION

Refer to FIG. **2**. A provider **100** of service of the invention first establishes in Web server **40** in Caller Alert Database **5** for each subscribed line **10** of subscriber **80** a set of storage resources **105** sufficient to store and use a list of Calling Line ID phone numbers **15** each with associated audio files **20** or tones **25**, and corresponding text **30** for display to CIAI subscriber **80** on a caller ID box or other text display device associated with one or more of lines **10** belonging to CIAI subscriber **80**.

Before any call to a line **10** for a subscriber **80** can be processed using features of this invention, subscriber **80** initiates a dialog with Customer Update Program **85** to store in Caller Alert Database **5** a list of calling line ID phone numbers **15**. For each calling line phone number **15**, subscriber **80** creates and stores an associated set of audio files **20** or tones **25**, and corresponding text **30** for display when caller identification is to be provided during another ongoing call. Dialog **95** between subscriber **80** and customer update program **85** may take place via a CGI or other World Wide Web interface, via an audio dialog over the phone itself, or by any other means consistent with the forms and content of data to be stored and presented.

Subscriber **80** may initiate dialog with Customer Update Program **85** at any time to initiate, terminate or modify information stored for subscriber **80** in Caller Alert Database **5**.

Refer to FIG. **3**. In the normal operation of the invention, a caller **90**, with phone number or identifier **110** attempts a call **115** to a phone number or identifier **120** for a subscriber **80** who uses the invention and who is at time of call **115** engaged with a prior call **125** on line **120**. Service infrastructure **55** detects busy status of line **120** and passes identities of caller line **110** and called line **120** to call control program **70**.

Call control program **70** determines that subscriber **80** is engaged in call **125** on line **120**, and activates caller ID program **75**.

Caller ID program **75** accesses database **5** to retrieve for subscriber **80** any calling line information containing any entry **15** for line **110** belonging to caller **90**.

If database **5** contains no calling line ID information **15** for subscriber line **120**, caller ID program **75** returns a notification to call control program **70** that no special treatment of caller **90** is prescribed. Call control program **70** initiates return of a standard busy notification to caller **90** via service infrastructure **55**, and exits.

If subscriber **80** has calling line information in database **5**, and subscriber line **120** is listed for subscriber **80**, caller ID program **75** retrieves Calling Line ID phone number data **10** for line **120**. If caller line identifier **110** is listed under subscriber line **120** in database **5**, caller ID program **75** retrieves for display and playback any audio files **20, 135** or tones **25** and corresponding text files **30** associated with caller line identifier **110** under subscriber line **120**. Caller ID program **75** passes audio files **20** and **135** or tones **25** and corresponding text **30** for line **120** to call control program **70**.

Call control program **70** uses any appropriate method well-known in the art to add to call **125** an audio feed **130** which is audible only to subscriber **80** on call **125** on line **120**. Call control program **70** plays audio files **20** for line **120** over feed **130** into call **125** on line **120**, mixing feed **130** input so that it is audible only to subscriber **80**, with ongoing call **125** audio signals using line **120**. During playing of audio files **20**, service infrastructure **55** or call control program **70** returns ringing signal or audio file announcement **135** to caller **90** by means well-known in the art.

If text **30** for line **120** for calling line **110** is returned to call control program **70**, call control program **70** transmits text **30** to a caller ID box **35** or other text display device associated with CIAI subscriber's line **120**, given the availability of such a display device.

Following presentation of caller ID information to subscriber **80** by call control program **70**, call handling proceeds by means commonly understood in the art. Subscriber **80** may choose to interrupt call **125** and take call **115**, or else continue call **125** and defer response to call **115**.

ALTERNATE EMBODIMENTS OF THE INVENTION

Refer to FIG. **3** and FIG. **2**. I an embodiment using PSTN technology, the invention is implemented completely within PSTN **60** except for Customer Update Program **85**, Caller Alert Database **5**, and access to Customer Update Program **85**, Caller Alert Database **5** by a subscriber **80** to the invention's services. In this embodiment, service infrastructure **55**, within PSTN **60** components such as switch **45** and adjunct call processing system **50**, manages all aspects of call control including access to Caller Alert Database **5** over a link between infrastructure **55** and a Web server **40**. Web server **40** contains Caller Alert Database **5** and Customer Update Program **85**, and provides update access to Caller Alert Database **5** and Customer Update Program **85** from subscriber **80**.

In this embodiment, the terms 'line' and 'phone number' have their traditional meanings as understood in PSTN telephony.

In an alternative embodiment using World Wide Web and voice-over-IP technology, the invention is implemented completely within the World Wide Web and the Internet. In this embodiment, the term 'line' means a logical path of voice access over a subscriber's Internet connection, and the term 'phone number' means an identifying name or label for such a path of access. Also, in this embodiment, the text associated with a calling line identifier appears on the subscriber's Web display rather than on a separate device.

In another alternative embodiment using streaming audio and video technology, the invention implements the storage and playback of combined audio, video and virtual-reality files to accomplish its signaling both to the subscriber and to the calling party, as connection bandwidths and display capabilities permit. Such files are edited and stored in the Customer Alert Database by the subscriber in the same manner as for other types of files or data.

In still another alternative embodiment using audio interaction scripting, the invention allows the caller to interact with the call control program to select from among alterna-

tives such as hanging up, leaving a voice message, leaving a text message or waiting for connection. Scripts for such programmed interactions are edited and stored in the Customer Alert Database by the subscriber in the same manner as for other types of files or data.

ILLUSTRATIVE EXAMPLE

Sam Townson, a lone businessman working from his home office, subscribes to the invention (Caller ID Alert Indicator, or CIAI) as provided by one of his local telecommunications exchange carriers. He uses his computer, browser and Internet connection to visit the carrier's CIAI website, where he uses interactive forms to set up his list of numbers for which he wants special treatment when CIAI is invoked. He includes in the list the number for his primary-care physician, Dr. Angela Parker; for her, he records a special audio message to announce her name to him whenever she calls: "This incoming call is from Dr. Parker's office. The call is awaiting attention." (sub x, line 1, CL1 D2). He adds a special acknowledgment message to be played for the caller at the same time: "Mr. Townson is being signaled, and should be with you shortly. Please remain on the line; he considers your call to be important." (sub x, line 2, CL1 D2).

Later, Sam is engaged in a call with his business partner Norman via his Web-based telephone connected through his workstation to his ISP's Web server. At this time Dr. Parker calls him with results of blood tests from his physical examination three days earlier. Dr. Parker is using a regular phone on the PSTN; she dials an ordinary telephone number for Sam.

Dr. Parker's call reaches an Internet gateway, where the dialed number is converted to an Internet address for Sam. The connection process from this point to Sam's Web server as for any PSTN-to-voice-over-IP call.

Dr. Parker's call, with its calling line number attached, arrives at the Web server handling Sam's Internet and telephone services and access. The Web server maintains information indicating that Sam is currently engaged in another call. The Web server finds Sam's list of calling line IDs in its database, locates Dr. Parker's line number in Sam's list, and retrieves audio files and text information from Dr. Parker's line number entry, along with a priority code for Dr. Parker that specifies playing audio files on any active call.

The Web server notifies Sam of the incoming call by playing Dr. Parker's audio file on Sam's side of the ongoing call. The Web server also presents Dr. Parker's text file in a window on the screen of Sam's workstation. Concurrently, the Web server feeds back to Dr. Parker the acknowledgment message Sam had recorded for Dr. Parker's office to hear.

While hearing the audio file being played by the server over his conversation on the prior call, Sam reads the text file's contents, and decides to take the call from Dr. Parker. He excuses himself from the first call, and signals the server to connect him directly.

The call between Sam Townson and Dr. Parker then continues normally.

CONCLUSION, RAMIFICATIONS, AND SCOPE OF INVENTION

From the foregoing detailed description, alternate embodiments and illustrative example, the convenience, simplicity and flexibility of the invention and its use should be apparent. Specifics of signaling, messaging and administration are relegated to commonly-accepted methods, combined with innovation so as to ease the burden of effort, and extend the possible set of call responses, for the subscriber to the invention's services.

The invention does not depend explicitly and fully on a specific substrate technology, PSTN or Web, for the handling of calls; instead, it offers a service that bridges the differences between these technologies, thereby- avoiding restrictive constraints that would otherwise limit its usefulness to both its subscribers and its providers. This freedom from such restrictions renders the invention more attractive, both personally and commercially, than many similar proposals previously developed.

Although the description, operation and illustrative material above contain many details, these details should not be construed as limiting the scope of the invention but as merely providing illustrations and examples of some of the preferred embodiments of this invention.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given above.

I claim:

1. A method for identifying a calling party to a subscriber to a call service, the method comprising the steps of:

storing one or more calling party identifiers for a subscriber to a call service, each of the one or more calling party identifiers identifying a respective calling party of interest to the subscriber;

receiving a first calling party identifier identifying a first calling party attempting to call the subscriber while the subscriber is connected to a third party;

matching the received calling party identifier with one of the one or more stored calling party identifiers;

providing an indicator as to the identity of the first calling party to the subscriber while the subscriber is still connected to the third party; and

providing a stored acknowledgement unique to the first calling party while the subscriber is still connected to the third party.

2. The method of claim **1**, further comprising the step of:

storing one or more unique indicators as to the identity of the first calling party along with the first calling party identifier.

3. The method of claim **2**, wherein the step of providing an indicator includes providing at least one of the one or more stored unique indicators as to the identity of the first calling party to the subscriber while the subscriber is still connected to the third party.

4. The method of claim **3**, wherein at least one of the one or more stored unique indicators is an audio indicator.

5. The method of claim **3**, wherein at least one of the one or more stored unique indicators is a visual indicator.

6. The method of claim **1**, further comprising the step of:

storing an acknowledgement unique to the first calling party along with the first calling party identifier.

7. The method of claim **1**, wherein the stored acknowledgement is an audio acknowledgment.

8. The method of claim **1**, wherein the one or more calling party identifiers are stored on one or more Web servers.

9. The method of claim **1**, wherein the subscriber is identified by a subscriber identifier, further comprising the step of:

storing the subscriber identifier along with the one or more calling party identifiers.

10. The method of claim 9, further comprising the step of:

receiving the subscriber identifier along with the first calling party identifier.

11. The method of claim 10, further comprising the step of:

matching the received subscriber identifier with the stored subscriber identifier so as to verify that the subscriber is a subscriber to the call service.

12. The method of claim 9, wherein the subscriber identifier is stored along with the one or more calling party identifiers on one or more Web servers.

13. The method of claim 1, further comprising the step of:

allowing the subscriber to add, delete, or modify a stored calling party identifier identifying a respective calling party of interest to the subscriber.

14. A computer signal embodied in a carrier wave readable by a computing system and encoding a computer program of instructions for executing a computer process for performing the method recited in claim 1.

15. A system for identifying a calling party to a subscriber to a call service, the system comprising:

at least one storage unit for storing one or more calling party identifiers for a subscriber to a call service, each of the one or more calling party identifiers identifying a respective calling party of interest to the subscriber; and

at least one processing unit for:

receiving a first calling party identifier identifying a first calling party attempting to contact the subscriber while the subscriber is connected to a third party;

matching the received calling party identifier with one of the one or more stored calling party identifiers;

providing an indicator as to the identity of the first calling party to the subscriber while the subscriber is still connected to the third party; and

providing a stored acknowledgement unique to the first calling party while the subscriber is still connected to the third party.

16. The system of claim 15, wherein the at least one storage unit comprises at least one Web server.

17. An article of manufacture for identifying a calling party to a subscriber to a call service, the article of manufacture comprising:

at least one processor readable carrier; and

instructions carried on the at least one carrier;

wherein the instructions are configured to be readable from the at least one carrier by at least one processor and thereby cause the at least one processor to operate so as to:

store one or more calling party identifiers for a subscriber to a call service, each of the one or more calling party identifiers identifying a respective calling party of interest to the subscriber;

receive a first calling party identifier identifying a first calling party attempting to contact the subscriber while the subscriber is connected to a third party;

match the received calling party identifier with one of the one or more stored calling party identifiers;

provide an indicator as to the identity of the first calling party to the subscriber while the subscriber is still connected to the third party; and

provide a stored acknowledgement unique to the first calling party while the subscriber is still connected to the third party.

18. The article of manufacture of claim 17, wherein the one or more calling party identifiers are stored on one or more Web servers.

19. The system of claim 15, further comprising:

at least one storage unit for storing the acknowledgement unique to the first calling party.

* * * * *

L Number	Hits	Search Text	DB	Time stamp
1	2	6542603.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 14:38
20	7134	ring$3 adj signal	USPAT; US-PGPUB	2004/08/31 15:40
21	332870	(internet or www or web)	USPAT; US-PGPUB	2004/08/31 15:40
22	134	(ring$3 adj signal) same ((internet or www or web))	USPAT; US-PGPUB	2004/08/31 16:16
24	838788	mobile or hand-held or 'hand held' or wireless or cellular or 'cell phone'	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 16:16
25	75	((ring$3 adj signal) same ((internet or www or web))) and (mobile or hand-held or 'hand held' or wireless or cellular or 'cell phone')	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 16:01
27	207096	tone	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 16:16
28	2883	tone same ((internet or www or web))	USPAT; US-PGPUB	2004/08/31 16:17
29	830	(tone same ((internet or www or web))) same call	USPAT; US-PGPUB	2004/08/31 16:17
30	104	((tone same ((internet or www or web))) same call) and 455/$.ccls.	USPAT; US-PGPUB	2004/08/31 16:50
31	379	((tone same ((internet or www or web))) same call) and 379/$.ccls.	USPAT; US-PGPUB	2004/08/31 16:45
36	232	(mobile or hand-held or 'hand held' or wireless or cellular or 'cell phone') and (((tone same ((internet or www or web))) same call) and 379/$.ccls.)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 16:44
37	183	(mobile or hand-held or 'hand held' or wireless or cellular or 'cell phone') same ((tone same ((internet or www or web))) same call)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 16:45
38	56	((mobile or hand-held or 'hand held' or wireless or cellular or 'cell phone') same ((tone same ((internet or www or web))) same call)) and 379/$.ccls.	USPAT; US-PGPUB	2004/08/31 16:45
42	6249	'audio file'	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 16:49
43	176	((internet or www or web)) same ('audio file') same call	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 16:50
44	13	(((internet or www or web)) same ('audio file') same call) and 455/$.ccls.	USPAT; US-PGPUB	2004/08/31 16:53
47	62	(((internet or www or web)) same ('audio file') same call) and 379/$.ccls.	USPAT; US-PGPUB	2004/08/31 16:53

L Number	Hits	Search Text	DB	Time stamp
3	2	6332024.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 10:16
10	2	6,411,684.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 10:21
11	2	6,714,637.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 10:36
12	2	4866766.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 10:51
13	16	4866766.URPN.	USPAT	2004/08/31 10:36
14	33	("4873719" | "5289530" | "5309512" | "5526406" | "5533102" | "5550908" | "5619561" | "5636269" | "5651054" | "5805587" | "5805677" | "5809128" | "5825867" | "5828742" | "5832060" | "5836009" | "5946381" | "5999613" | "6028922" | "6078581" | "6104800" | "6219414" | "6253075" | "6269159" | "6308221" | "6317488" | "6339639" | "6343121" | "6347136" | "6389124" | "6393106" | "6404858" | "6445694" | "2001/0043691").PN.	USPAT	2004/08/31 10:43
15	582923	internet or www or web	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 10:51
16	12	(("4873719" | "5289530" | "5309512" | "5526406" | "5533102" | "5550908" | "5619561" | "5636269" | "5651054" | "5805587" | "5805677" | "5809128" | "5825867" | "5828742" | "5832060" | "5836009" | "5946381" | "5999613" | "6028922" | "6078581" | "6104800" | "6219414" | "6253075" | "6269159" | "6308221" | "6317488" | "6339639" | "6343121" | "6347136" | "6389124" | "6393106" | "6404858" | "6445694" | "2001/0043691").PN.) and (internet or www or web)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 10:52
17	4	4866766.URPN. and (internet or www or web)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/08/31 11:11
18	540	455/567.ccls.	USPAT; US-PGPUB	2004/08/31 11:12
19	2800	ring$3 adj tone	USPAT; US-PGPUB	2004/08/31 11:12
20	191	(internet or www or web) same (ring$3 adj tone)	USPAT; US-PGPUB	2004/08/31 11:12
21	13	455/567.ccls. and ((internet or www or web) same (ring$3 adj tone))	USPAT; US-PGPUB	2004/08/31 11:26
22	63	((internet or www or web) same (ring$3 adj tone)) and 455/$.ccls.	USPAT; US-PGPUB	2004/08/31 11:41

23	50	(((internet or www or web) same (ring$3 adj tone)) and 455/$.ccls.) not (455/567.ccls. and ((internet or www or web) same (ring$3 adj tone)))	USPAT; US-PGPUB	2004/08/31 11:27
26	35	((internet or www or web) same (ring$3 adj tone)) and 379/$.ccls.	USPAT; US-PGPUB	2004/08/31 11:43
29	3	((internet or www or web) same (ring$3 adj tone)) and 379/373.02.ccls.	USPAT; US-PGPUB	2004/08/31 11:43